Electronic typewriter VW2140

Service
Service
Service

02/03/04/05/08/10/11/12/13/16/17/19/20

VW2240

02/03/04/05/08/12/13/16/17/19/20

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VW2140

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VW2240

Service Manual

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Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

DocumentationTechnique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Serviçio

Subject to modification

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PREFACE

This manual provides Service infomation for the maintenance of the Philips VW2140 and VW2240 Electronic Typewriters.

The manual is divided into sections that cover the different service areas required to service the machine. Thus, there is an Adjustment Section, Removals Section, etc. Refer to the Contents Page for a listing of subjects covered.

Except for the Specifications Sections, there is an Index of all infomation provided in each Section at the beginning of the Section.

Throughout the Manual, directional terms such as front, rear, top, bottom, left, right, etc., always refer to the machine as used by a typist. Consequently, "right" always refers to the Platen Knob side of the typewriter, regardless of the machine position necessary for checking a requirement or making an adjustment.

Satisfactory performance requires that all parts be properly adjusted and lubricated, and their movements be free of binds. Worn or broken parts should be replaced.

IMPORTANT

Some service procedures require working with static sensitive devices, such as the Printed Circuit Boards. Whenever a procedure involves one of these devices, the procedure is marked:

OBSERVE STATIC PRECAUTIONS

ESD

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

SERVICE TOOLS

In addition to common service tools (screwdriver, pliers, volt/ohm-meter, etc.) normally required for typewriter service, the following tools are needed for servicing the VW2110 and VW2210:

- MTA wire inserter (.100" centers) (4822 395 90605)
- Torx screwdrivers (T-8 and T-10) (4822 395 50145)
- Feeler gage set .0015"-.025"
- #0 Phillips screwdriver
- 1/4" nut driver
- 1/4" and 3/16" open end wrench

Message on LCD

In some cases the typewriter wil give messages on the LCD (VW2240 only).
The messages mentioned in this manual are in the english language.
For the corresponding messages in other country versions, see the table below.

Country version	Alignment test	Lid? Ribbon?	Memory lost	RAM ...	RAM check	Sure? Y/N	Test complete
/00/03 /10	Afregel-test	Kap? Linten?	Geheugen leeg	RAM ...	Controle RAM	Zeker? J/N	Test uitgevoerd
/02/11	Ausrichtungs-test	Deckel/ Farbband?	Speicher-verlust	Speicher ...	Speicher-Prüfung	Sicher? J/N	Test beendet
/04	Justerings-test	Deksel? Bånd?	Tapt minne	RAM ...	RAM kontroll	Er du sikker? J/N	Test utført
/08	Prova allineam.	Coperch.? Nastri?	Perso memoria	RAM ...	Controllo RAM	Sicuro? S/N	Prova eseguita
/12/19	Test alignement	Capot? Rubans?	Mémoire effacée	Mémoire ...	Vérif. mémoire	Certain? O/N	Test terminé
/13	Skrivhuvuds-test	Kåpa? Färgband	Minnet Förlorat	RAM ...	RAM testas	Helt säkert? J/N	Testen avslutad
/15	Skrivehoved-test	Låg? Farvebånd?	Hukommelse tabt	RAM ...	RAM kontrol	Sikker? J/N	Test udført
/16	Prueba alineac	¿Tapa? ¿Cintas?	Pérdida memoria	RAM ...	Verificación RAM	¿Está seguro? S/N	Prueba terminada
/17	Teste Alinham.	Tampa? Fitas?	Memória Perdida	RAM ...	Verifcaç. de RAM	Tem Certeza? S/N	Teste Completo

SECTION 1

SPECIFICATIONS

Power Supply

Power Requirements: *See Electrical Rating Label on Bottom of Casing Base.*

230 VAC/50 Hz ± 10%
or
240 VAC/50 Hz ± 10%

Thermal Protection:	130° C Thermal Cutout in Transformer
Transformer Output:	24 VAC
Approximate Power Consumption:	6.5 Watts (Idle) 45 Watts (Printing)

Keyboard

- 56 Key Electronic Keyboard
- Molded Dome Conductive Switches with Leaf Return Springs
- 7 x 8 Electronic Keyboard Matrix
- Repeat Keys: All 56 Keys

Electronics

Non-Dictionary Models: • Control PC Board with 8052 Microcontroller. • Integrated power supply on board supplies +5 VDC ± 5% (Logic) and +18 VDC ± 5% (Motors, Solenoids). • 128 character current typing line correction memory. • 10 character keyboard input buffer.

Dictionary Models: • Control PC Board with 8032 Master Microcontroller, 8052 Slave Microcontroller, and 2 Megabit ROM on International Models for the Spell-Right Dictionary. • Integrated Power Supply on Control PC Board supplies +5 VDC ± 5% (Logic) and +18 VDC ± 5% (Motors, Solenoids). • 108 character current typing line correction buffer. • 16 character Keyboard input buffer.

Printing/Paper Handling

Printing Technique:	Fully formed character Daisy Print Element
Character Set:	96 printable characters on Print Element
Character Spacing (Pitch):	10 CPI: .100" (2.5mm) per space 12 CPI: .083" (2.2mm) per space
Typing Line Length:	<u>Non-Dictionary and Dictionary Non-LCD Models</u>: 9" (228.6mm) 10 Pitch: 90 Characters per line 12 Pitch: 108 Characters per line <u>Dictionary -- LCD Models</u>: 8.9" (226.1mm) 10 Pitch: 89 Characters per line 12 Pitch: 107 Characters per line

Printing/Paper Handling (continued)

Print Speed:	10 Characters per Second (max) -- Non-Dictionary Models 12 Characters per Second (max) -- Dictionary Models
Print Direction:	Unidirectional (left to right) in Typewriter Mode (Non-LCD Models) Bi-directional from Memory (LCD Models)
Margins:	• Left Margin preset at space 10 (10 pitch) • Right Margin preset at space 77 (10 pitch) • Machine beeps at Right Margin • Types through Margin after stopping or beeping at Margin
Tabs:	Up to 8 programmable tab settings
Ribbon Cassette Yield:	*Correctable Carbon*: • 42,000 Characters *Multi-Strike*: • 205,000 Characters
Correction Cassette Yield:	*Lift Off (For Correctable)*: • 2700 Characters *Cover Up (For Multi-Strike)*: • 1600 Characters
Paper Feed:	Friction, Single Sheets or Forms
Linespacing:	• 1 (6 Lines per Inch) • 1 1/2 (4 Lines per Inch) • 2 (3 Lines per Inch) • 1/2 for Super & Subscript • Variable through Platen Knob
Maximum Paper Width:	12" (304.8mm)
Paper Capacity:	1 original plus 2 copies
Stepper Motors:	4 Phase, Bi-directional, Permanent Magnet

	Carrier Motor	*Element Motor*	*Index Motor*
Step Angle:	7.5°	7.5°	7.5°
Steps Per Revolution:	48	48	48
Resistance Per Phase:	50 Ω ± 7%	24 Ω ± 7%	50 Ω ± 3.5 Ω
Run Voltage:	+18 VDC	+18 VDC	+18 VDC
Hold Voltage:	+5 VDC	None	None

Physical Dimensions (Large Jackets)

- Height: 4.94" (125.5mm)
- Width: 16.33" (414.8mm)
- Depth: 14.65" (372.1mm)
- Net Weight (Non-LCD Models): Approximately 11.96 lbs (5.44 Kg)
- Net Weight (LCD Models): Approximately 12 lbs (5.46 Kg)

Environmental Conditions

- Operating Temperatures: 55° F to 100° F (13° C to 38° C)
- Operating Relative Humidity: 10% to 80%
- Storage Temperature: -40° F to 160° F (-40° C to 71° C)
- Storage Relative Humidity: 5% to 95%

SECTION 2

THEORY OF OPERATION

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1A) Power Supply VW2140

Power Supply Large Jacket Models (Refer to Page 7F-1 for Schematic Diagram)

When the Typewriter's AC plug is inserted into an AC wall outlet, line voltage is applied to the primary and secondary windings of the transformer, and stepped down voltage (24 VAC) is applied to the Power Switch. When the Power switch is moved to the ON position, the (24 VAC) is applied to the input of the Bridge Rectifier (CR13).

The output of the Bridge Rectifier applies unfiltered 36 VDC to the Source (S) of MOSFET Q1. Regulator U3 provides a switching input to the Gate (G) of Q1. With this input at the Gate, MOSFET Q1 provides a pulse width modulated output at its Drain (D). The output is applied to the input of an LC Circuit consisting of Coil L1 and Capacitor C7. This LC Circuit produces a regulated +18 VDC ± 5% output at the positive side of Capacitor C7. Feedback through divider R3 & R4 enables U3 to provide proper pulse width modulation to Q1 to maintain a constant 18V output.

The regulated +18 VDC is applied to Pins 1, 6, 7, and 8 of Regulator U4. With this input, U4 provides a pulse width modulated signal to the LC Circuit consisting of L2 and C10 to create a regulated +5 VDC ± 5% output at the positive side of Capacitor C10.

Watchdog Circuit for VW2140

The 5AEI Control PC Board has a Watchdog which monitors the Software Functions of the PC Board. If the Software is functioning properly, a short duration negative pulse is generated at Pin 8 of Microprocessor U1. The +5V portion of this pulse turns on Q2 long enough to allow C14 a discharge path. As long as Q2 turns on periodically, C14 does not charge sufficiently to turn on Q3, which in turn maintains Q4 in the "Off" or open state. This sustains a low (inactive) state at the Reset Input (Pin 9) of U1.

If the Software fails to function properly, the pulse at U1 Pin 8 is interrupted. If a constant low is present at Pin 8, Q2 turns off, which charges C14. If a constant high is present at Pin 8, C13 charges up, turning off Q2. When Q2 turns off, C14 begins to charge. When C14 charges sufficiently, Q3 turns on, turning on Q4, which places a high on the Reset Line (Pin 9) of U1. This resets the Microprocessor (U1) which reinitializes the machine. As long as U1, Pin 9 is held high, C15 charges. When C15 charges sufficiently to forward bias CR9, Q2 turns on, discharging C14, which turns off Q3 & Q4 taking the Microprocessor out of reset. If the problem still exists, the Watchdog will continue to cycle until power is interrupted.

1B) Power Supply and Watchdog Circuits VW2240

Power Supply for Large Jacket, Dictionary Models (Refer to Page 8F-1 for Schematic Diagram)

When the typewriter's AC plug is inserted into an AC wall outlet, line voltage is applied to the primary and secondary windings of the transformer, and stepped down voltage (24 VAC) is applied to the input of Bridge Rectifier (CR10) and, on LCD Models, the base resistors of Transistor (Q2). The output of the Bridge Rectifier, applies unfiltered 36 VDC to the Source (S) of MOSFET Q1. Regulator U7 provides a switching input to the Gate (G) of Q1. With this input at the Gate, MOSFET Q1 provides a pulse width modulated output at its Drain (D). This output is applied to the input of an LC Circuit consisting of Coil L1 and Capacitor C30. This LC Circuit produces a regulated +18 VDC ± 5% output at the positive side of Capacitor C30. Feedback from Divider R6 & R7 maintains a constant 18V output. This regulated +18 VDC is applied to Pins 1, 6, 7, and 8 of Regulator U8. With this input, U13 provides a pulse width modulated signal to LC Circuit L2 and C29 to create a regulated +5 VDC ± 5% output to the positive side of Capacitor C29 using feedback from R8 & R9.

The +5 VDC is applied to various Circuits and Integrated Circuits on the Control PC Board. On LCD Models, the Collector Circuit of Transistor Q2 requires +5 VDC, the base of Q2 tied to the Transformer Secondary to monitor line power. The output of Q2 is connected to the PDI Port of the Master Microprocessor U1. The Master Processor continues to function as long as the PDI continues to toggle at 50 to 60 Hz.

Watchdog Circuit for VW2240

The Watchdog on 5A Dictionary Models monitors the Slave Software and shuts down the Master, Slave, and the Static RAM Chip if any problem develops. If the Software functions properly, a short duration negative pulse is developed at Pin 8 of U2. This square wave turns Q3 on enough to keep C16 discharged. If the pulse at Pin 8 stops, Q3 turns off, and C16 charges. When C16 is charged to 1V, Q4 turns on, placing a low potential on the base of Q5, turning Q5 on. Q5 in turn places a 1V potential on the base of Q6, and Q6 turns on. With Q6 on, Pins 9 and 10 of U6 are pulled low, placing a high on Pin 8 (U6). This high is placed on the reset pins of U1 and U2 and on Pins 12 and 13 of U6. A high on Pins 12 & 13 of U6 develops a low output on Pin 11 which resets the RAM Chip (U3). While U6 is held on to maintain reset, C18 charges. When C18 charges to +1.5V, Q3 is turned on and the Watchdog is reset. If the problem still exists, the Watchdog cycles again. On LCD Models, 3 Pin Regulator U15 in the Watchdog Circuit monitors the 5V line. If the 5V line drops below 4.5V, U15 generates a low on Pin 1 which turns on Q5 to trigger the Watchdog.

2) Initialization

The initialization sequence is described below.

A) When power is turned on, the Ribbon Solenoid quickly energizes to insure the Ribbon mechanism is in its proper starting position.

B) The Electronics moves the Carrier slightly to the right, to insure Carrier is not at the Left End Switch and then slightly to the left to insure the Carrier is not at the right end of the machine.

C) The Index Motor Shaft rotates 1/2 forward linespace and then 1/2 reverse linespace to establish a positive writing line.

D) Then, the Element Motor rotates quickly to snap the Element onto the Drive Disc, and stops.

LCD Models: Note: If a Right Ribbon Cassette is not placed in the Carrier or the wrong Ribbon Cassette is placed in the Carrier or the Lid Switch is closed (Lid open), steps A through D are performed, but the Carrier only moves right approximately $1^1/_4$" and stops. The LCD displays "LID?-RIBBONS?." If the proper Ribbon Cassette is installed in the Carrier and the Lid is closed, the machine continues its normal initialization sequence.

E) The Carrier moves left until the Left End Switch Positioner closes the Left End Switch; quickly moves right to open the Switch; left to close the Switch again; and continues approximately .100" further and stops.

Non-LCD Models: Note: If a Right Ribbon Cassette is not placed in the Carrier or the wrong Ribbon Cassette is placed in the Carrier, the Carrier moves left until the Left End Switch Positioner closes the Left End Switch and the Carrier moves right to approximately space 8 or 9 and stops. The Shift Lock LED starts to flash and initialization stops. If the proper Ribbon Cassette is installed in the Carrier, the machine continues its normal initialization sequence.

F) The Element rotates slowly counterclockwise until the Left End Switch Positioner drops into the Element Home Notch on the Rear Scissors Gear under Spring Tension, which opens the Left End Switch, and the Element stops rotating.

G) The Carrier moves right approximately .300" to establish position "0," and then continues to the preset Left Margin (Space 12). The default settings are 10 pitch, with Left Margin at 12, and Right Margin at 72.

The Left End Switch is also used as a Lid Switch. Whenever the Deck is raised, the Lid Switch Actuator closes the Left End Switch through Spring tension. On Non-LCD Models, the Shift Lock LED flashes. On LCD Models, the Carrier moves to position 84 and the LCD displays "LID?-RIBBONS?." When the Deck is closed, the Switch opens, and the Carrier reinitializes and relocates to its previous position ready for typing.

3) Keyboard

The Keyboard is composed of Keybuttons mounted in a plastic housing along with individual leaf-type springs, molded Dome Conductive Switches, a Flexible Circuit PC Board, and a metal plate. When a Keybutton is depressed, the Keybutton contacts the leaf-type spring which in turn pushes down on a Molded Dome Conductive Switch. The Conductive Switch then comes into contact with the 7 x 8 Matrix Flexible Circuit PC Board which now completes a Circuit between a specific Column and Row. This completed Circuit is then read by the Electronics of the Control PC Board which determines what Key was depressed. Refer to the appropriate Diagrams Section for Keyboard Layout and Keyboard Matrix Chart.

A) **Key Scanning:** After a Key is depressed, the Electronics sequentially pulses Keyboard Rows R6, R5, R4, R0, R1, R2, R3, and R7 every 5ms. The Keyboard Matrix Columns C0 through C6 are sequentially read by the Electronics.

The Molded Dome Switch closes a Circuit in the Keyboard Matrix so that when a pulse appears in that Keybutton's "R" Row, the pulse also appears in the Keybutton's "C" Column. The Electronics determines which Keybutton was depressed by comparing which "R" Row was pulsed at the point in time that the "C" Column became active. If the same "R" Row and "C" Column activity is detected through two scanning cycles, the Electronics interprets this as a valid Keybutton depression and activates the Circuits to perform the appropriate function. If no Key is depressed, the electronics keeps all rows low to quickly identify a depressed key. After that Keybutton is identified, the electronics returns to sequentially pulsing the Keyboard Rows.

When any Keybutton is held down, the Electronics delays 500ms after performing a function to verify that a repeat is desired, and then activates the Circuits to continue performing that function until the Keybutton is released.

B) **Shift Lock LED:** When the Shift Lock Keybutton is depressed, the Electronics recognizes the Key through the Matrix as described above, and then energizes the LED. When either Shift Keybutton or Shift Lock Keybutton is subsequently depressed, the Electronics turns the LED off.

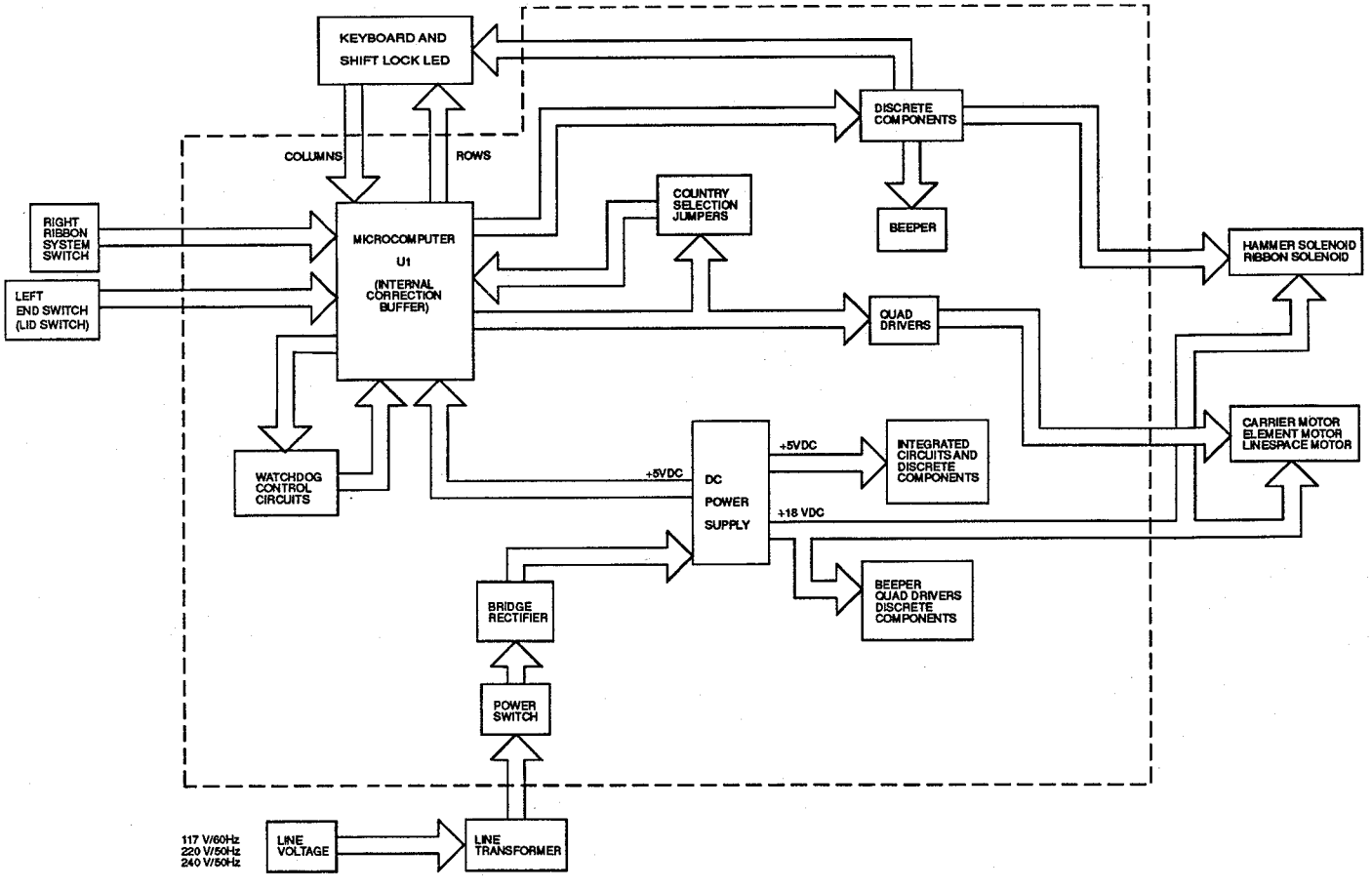
4A) ELECTRONICS (Non-Dictionary Models)

The Electronics consists of the components on the Control PC Board. The heart of the Control PC Board is Microcomputer U1. Its basic functions include the following:

A) Maintains control of the initialization process.
B) Determines and activates which Motors and Solenoids must be energized to perform the function, and when and for how long they must be energized.
C) Monitors Left End Switch/Lid Switch and Right Ribbon System Switch.
D) Sends the Keyboard Scanning pulses to the Keyboard, and interprets which Keybutton is depressed when a Circuit is closed on the Keyboard.
E) Stores input characters in the Keyboard Input buffer and sends characters to the correction buffer.
F) Interprets user selectable inputs, decides which function to perform: If upper or lower case characters are to be printed; the pitch selected for spacing; and (when required) the amount of vertical linespacing.
G) Reads the Country Selection Jumpers to determine which Keyboard and Printwheel is in use.

Other Major components on the Control PC Board include +5 & +18 VDC Power Supplies, Power Switch, and other Integrated Circuits and discrete components.

Electronic Block Diagram (Non-Dictionary Models)



4B) Electronics (Dictionary Models)

The Electronics consists of the components on the Control PC Board. The heart of the Control PC Board consist of U1 Master Microcomputer, U2 Slave Microcomputer, and a ROM Chip. (**LCD Models only**: 16 Character Liquid Crystal Display, 8 K Byte RAM and a battery backup). Their basic functions include the following:

A) Maintains control of the initialization process.

B) Determines and activates which Motors and Solenoids must be energized to perform the function, and when and for how long they must be energized.

C) Monitors Left End Switch/Lid Switch and Right Ribbon System Switch.

D) Sends the Keyboard Scanning pulses to the Keyboard, and interprets which Keybutton is depressed when a Circuit is closed on the Keyboard.

E) Stores input characters in the Keyboard Input buffer and stores characters in the correction buffer.

F) Interprets user selectable inputs, and decides which functions to perform; if upper or lower case characters are to be printed; the pitch selected for spacing; and (when required) the amount of vertical linespacing.

G) Checks words as they are typed against the dictionary (within the One or Two Meg ROM) for any misspellings. When a misspelling is detected, processes signals necessary for dictionary functions.

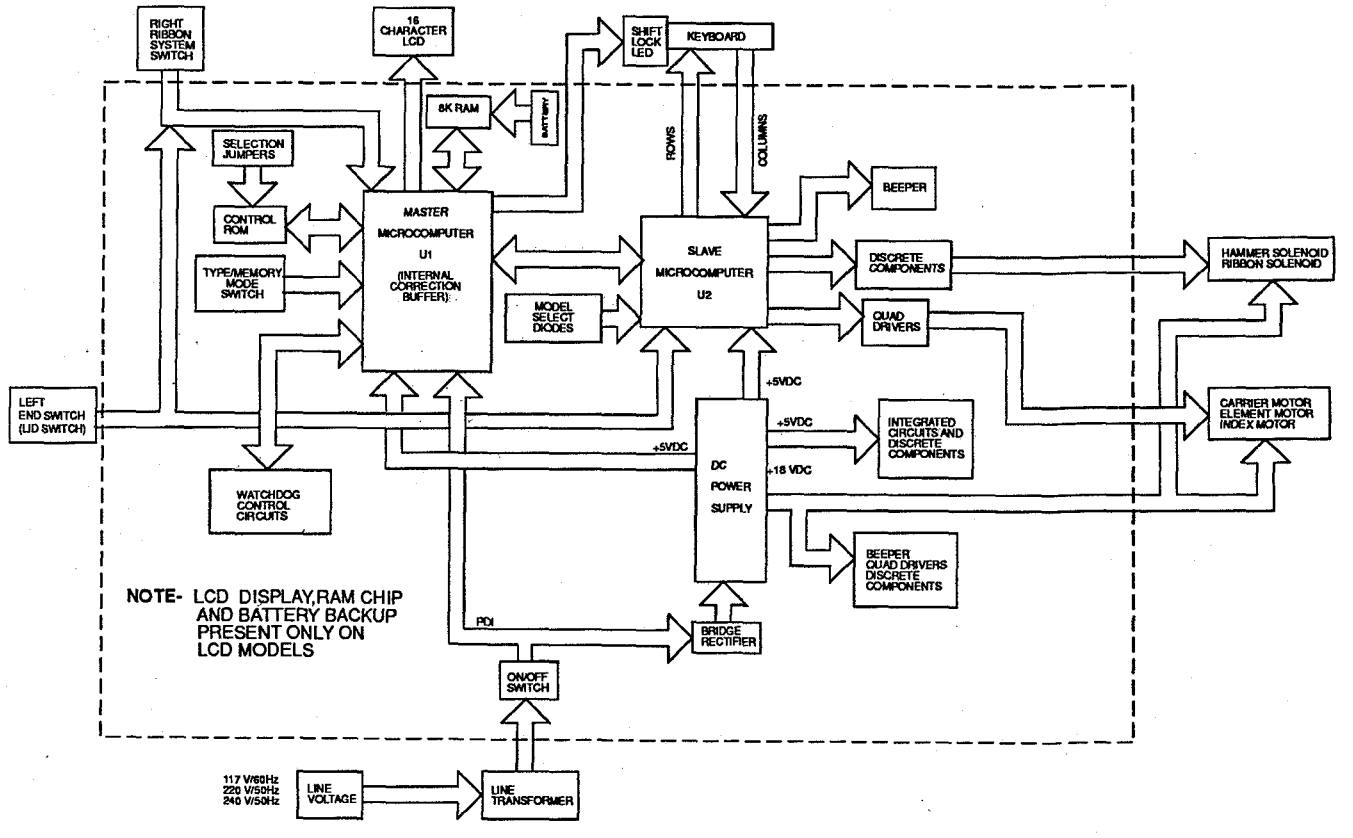
LCD Models only:

H) Displays characters, operator prompts, and format options.

I) Stores up to 7 K Bytes of information and text in RAM memory backed up by a battery.

Other Major components on the Control PC Board include +5 & +18 VDC Power Supplies, On-Off and Typewriter-Memory (Type-Mem) Switches, other Integrated Circuits, and Country Selection Jumpers.

Electronic Block Diagram (Dictionary Models)



5) Stepper Motors

There are three unipolar, four phase, Permanent Magnet Stepper Motors in the machine--the Index, Carrier, and Element Motors.

A) Construction

Each Stepper Motor is made of a radially magnetized Rotor with alternating North and South Poles, and two Stator Sections, A and B.

The Stator Sections each have Bifilar coils wound around a plastic bobbin in the inside diameter of the Stator. When the two Stator Sections are assembled, the teeth of one section are aligned one half tooth away from similar teeth in the other section.

Opposite ends of the Bifilar coils are connected internally and brought out of the stator through a common lead wire. The other end of each coil can be switched to ground through the Electronics. Only one coil of each Bifilar pair is switched to ground at any given time. There are two Bifilar pairs in the stator. The windings in one pair are referred to as A and A', and the windings in the other pair are called B and B'. The direction of current flow is the same in windings A and B, which is opposite to the direction of current flow in A' and B'. The current flowing through the coil creates lines of magnetic flux which charge the Stator Teeth as either North or South Poles. The Stator is constructed so that adjacent teeth are opposite poles when current is flowing through the coil. When current flows in the opposite direction, the polarity of the Stator Teeth changes to attract and repel the poles on the Rotor. Sequentially changing the direction of current flow rotates the Rotor through magnetic attraction and repulsion.

B) Drive Strategy

The three Stepper Motors make use of different Run, Settle, and Hold voltage levels during operation which are regulated by the Electronics. A run level voltage is applied to the active halves of the coils to produce a strong magnetic field during operation. A settle level voltage is used as a transition voltage when one half of a coil is switched off and the other half switched on. The Carrier Motor also makes use of a third voltage level (Holding Voltage), when stationary, to keep the Carrier stable for printing. The Holding Voltage is drawn off the +18 VDC, and stays between +4 to +5 VDC.

Operating Voltages

Motor	Run Voltage	Settle Voltage	Holding Voltage
Carrier	+18 VDC	+18 VDC	+5 VDC
Element	+18 VDC	+18 VDC	None
Index	+18 VDC	+18 VDC	None

As the Motor Phases change the lines of magnetic flux, the Permanent Magnet Rotor rotates through magnetic attraction and repulsion. The Electronics reverses the phase sequence for reverse Rotor rotation.

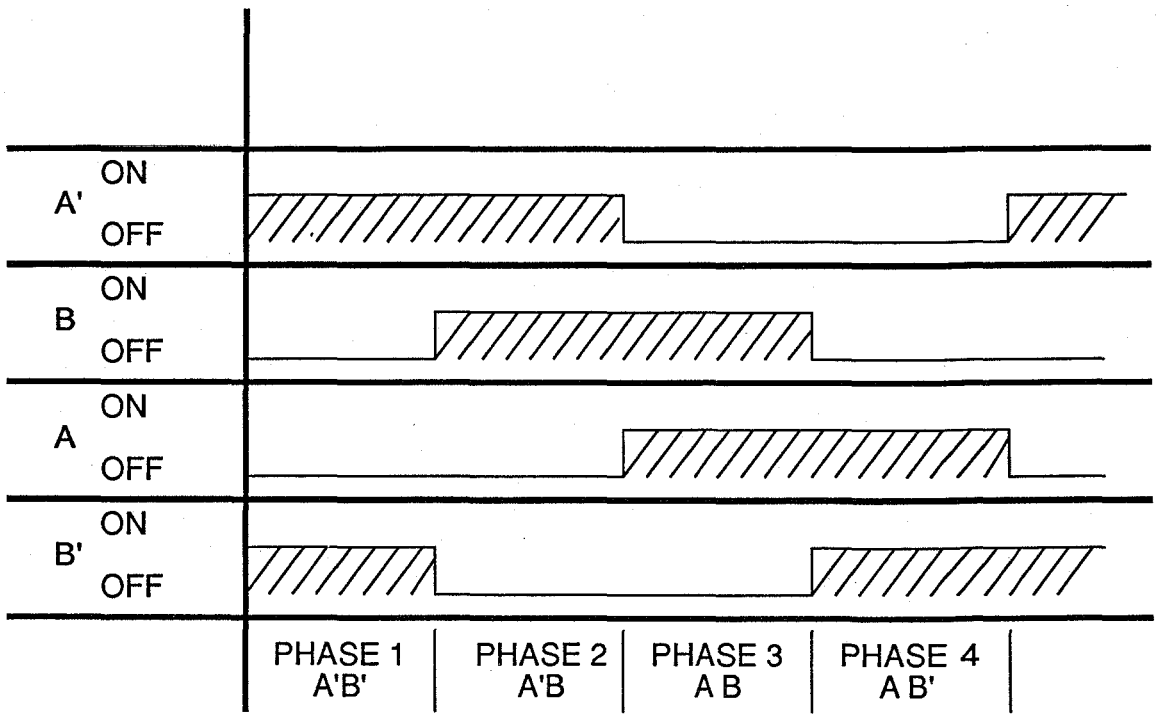
Note: The terms "Phase 1," "Phase 2," etc., are used for description purposes only. The actual starting phase for any motor move is dependent upon where the motor stopped in its previous move, and on the programming in the Electronics. All subsequent motor steps follow the normal sequence. The starting phase for the Carrier Motor is dependent upon the pitch selected and the actuation point of the Left End Switch.

5) Stepper Motors (continued)

C) Step Angles

The Stator Teeth and magnetic Rotor Poles of each motor are arranged so that each successive Phase that is energized rotates the Rotor the same number of degrees. The step angle for all Motors is 7.5°, which means there are 48 full steps per revolution. The number of phases that are energized to perform any particular function is dependent on the nature of the function.

STEPPER MOTOR TIMING CHART



6) Carrier Drive

The Carrier Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Carrier Motor rotates clockwise and counterclockwise to move the Carrier left and right along the Carrier Rails for printing, correction, and spacing functions.

There is a 12 tooth Drive Gear permanently attached to the Carrier Motor Rotor Shaft. This Gear meshes with a one piece Carrier Drive Rack which mounts above the Carrier Drive Gear. The Carrier Drive Gear is under tension by a Spring and Anti-Backlash slider that pushes down on the Carrier Drive Rack. This spring tension reduces Gear backlash and maintains a constant mesh between the Carrier Drive Rack and Gear.

7) Element Drive

The Element Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Element Motor rotates clockwise and counterclockwise to place the desired character on the Print Element in line with the Hammer for printing and correction.

There is a 48 tooth Drive Gear permanently attached to the Element Rotor Shaft. This Drive Gear is in mesh with a 96 tooth, two piece Element Scissors Gear. The front half of the Element Scissors Gear is pressed onto the Element Drive Shaft, so that when the Element Motor rotates clockwise and counterclockwise the Element Drive Disc rotates also.

The Left End Switch Positioner is mounted on the rear cross frame of the Frame Assembly. During initialization, the Left End Switch Positioner tooth contacts the ridge on the Rear Scissors Gear. When the Element Motor rotates counterclockwise, the Positioner Tooth drops into the Notch in the Gear Ridge to stop the Element at Home Position.

The Element Drive Disc has two rectangular holes and one round hole which are keyed to fit the Print Element. When a Print Element is inserted, and the Hammer Assembly is pivoted rearward against the Element, the Element Pusher (mounted in the Hammer Solenoid Bracket) pushes the Element against the Drive Disc. During initialization, the Element rotates quickly clockwise to snap the Element into the keyed holes in the Element Drive Disc under tension of the Element Pusher. The keyed holes assure that the Home Character (e) is at Print Position when the Positioner Tooth is engaged in the Notch on the Rear Scissors Gear.

Element Home Position is established during initialization. If a new Print Element is inserted after initialization, opening and closing the Lid reinitializes the machine to reestablish Home position.

The Electronics is programmed to select the shortest distance to the next printable character on the Element whether printing from the Buffer or starting at Home Position.

8) Print Hammer

The Print Hammer is pivotally attached to the Hammer Assembly Bracket, and rests on the Hammer Solenoid Plunger under spring tension. When the Electronics energizes the Hammer Solenoid for printing, the Solenoid Plunger moves upward to pivot the Hammer top rearward to strike the Print Element Petal in its path against the Platen. When the Hammer Solenoid is de-energized, the Hammer returns to rest under spring tension.

The Electronics is programmed to energize the Hammer Solenoid for longer or shorter periods of time to provide stronger or weaker impression for individual characters. For broad faced characters (W, M, etc.), the Electronics energizes the Solenoid for a longer period of time than for small faced characters (., _, etc.). There are various time periods programmed in the Electronics to provide equal impression among all characters in any pitch.

9) Ribbon Cassette Feed/Correction Cassette Lift & Feed

The Ribbon Cassette Feed and Correction Cassette Lift & Feed are both driven by the same mechanism. This mechanism has one Solenoid which is energized every Ribbon Cassette or Correction Cassette cycle. A latching system, controlled by the energizing of the Print Hammer Solenoid, triggers either a Ribbon Cassette Feed or a Correction Cassette Lift and Feed. The normal position of this latch mechanism is Correction Cassette Lift and Feed.

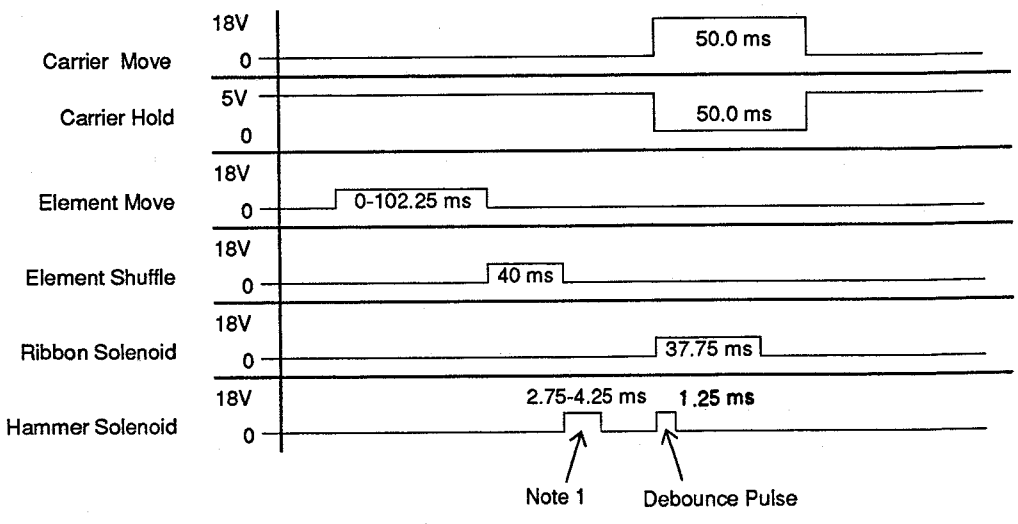
The Electronics determines from the Keybutton depressed whether the feed should be Ribbon Cassette or Correction Cassette. A brief sequence for each action follows:

A) **Ribbon Cassette** - the Element rotates to the selected character; the Hammer fires to print the character and trip the Ribbon mechanism for a Ribbon Cassette Feed; the Ribbon Solenoid energizes to feed the Ribbon Cassette; the Carrier moves right one space (see Print Cycle Chart below).

Notes: 1) When the Ribbon Solenoid is de-energized, the Ribbon mechanism returns to the Correction Cassette Lift and Feed position.
2) The Ribbon advance during a Ribbon Cassette cycle is for the next printable character.

B) **Correction Cassette Lift & Feed** - the Carrier moves left or right to the character location; the Element rotates to the selected character; the Ribbon Solenoid energizes to lift the Correction Cassette Ribbon, and advance the Take-up Feed Pawl; and the Hammer fires to transfer the character to the Correction Ribbon. The Ribbon Solenoid de-energizes, allowing the Correction Bail to drop to its normal position which feeds the Correction Ribbon and returns the Ribbon mechanism to the Correction Cassette Lift and Feed position.

PRINT CYCLE -- SINGLE CHARACTER (10 PITCH)



NOTE 1:
LENGTH OF PULSE VARIES WITH THE PITCH SELECTED AND HAMMER ENERGY LEVEL.

10) Ribbon Cassette Feed Mechanism

When latched for Ribbon Cassette feed, the Ribbon Cassette Feed mechanism feeds Ribbon when the Ribbon Solenoid is energized. The top of the Ribbon Driver seats in the Drive Gear in the Ribbon Cassette. The bottom of the Ribbon Driver seats into the Ribbon Ratchet Hub which in turn fits over the Ribbon Feed Shaft. On the bottom of Ribbon Feed Shaft is an Anti Backup Feed Spring which allows the Feed Shaft to rotate only in one direction.

After printing the previous character, the Ribbon Solenoid energizes and pulls the pawl of the Ribbon Feed Assembly in the teeth of the Ribbon Drive Ratchet Hub. This action rotates the Ribbon Feed Shaft, which rotates the Ribbon Driver approximately 30° for each printable character. The Ribbon Cassette is now positioned for the next printable character.

11) Correction Cassette Lift & Feed Mechanism

When the Ribbon mechanism is in its normal position, it is ready for a Correction Cassette Lift and Feed cycle. As the Ribbon Solenoid plunger is pulled into the Solenoid, the bottom of the Correction Bellcrank is pulled forward, moving the top tail upward, which causes the Correction Bail to lift upward. As the Bail raises, the Correction Ribbon Feed Pawl ratchets over approximately five teeth of the Take-up Ribbon Hub Ratchet. When the Ribbon Solenoid Plunger is released, spring tension on the Bail returns all parts to rest. As the Bail lowers, the Feed Pawl advances approximately five teeth of the Take-up Ribbon Hub Ratchet to rotate the Supply Feed Ribbon Hub Ratchet approximately five teeth past the Holding Pawl to feed the Correction Ribbon by one character position.

12) Right Ribbon System

The purpose of the Right Ribbon System is to alert you of an attempt to install a mismatched set of Ribbon and Correction Cassettes. For example: "Correctable" Film Ribbon with "Cover-Up" Correction Cassette is a mismatch. If a mismatched set is inserted, the Ribbon Cassette will not fit properly into the typewriter. Also, the Shift Lock LED flashes or "LID?-RIBBONS?" is displayed in the LCD when the Deck of the typewriter is closed.

The Right Ribbon System allows the typewriter to operate with a Ribbon Cassette only, but not with a Correction Cassette only.

The Right Ribbon System consists of a Right Ribbon Switch, Correction Cassette mechanism, Keyed Correction Cassette, and Keyed Ribbon Cassette. When the proper match between the Correction and Ribbon Cassettes exist, the Right Ribbon Switch is actuated (opened) by a tab on the Ribbon Cassette. With the Switch actuated, the Electronics on the Control PC Board is satisfied that a proper match exist between print and Correction Ribbons and allows the typewriter to function.

13) Paper Feed

Driven by the Electronics, the Index Motor rotates clockwise and counterclockwise to drive the Platen for Paper Feed.

On the Index Motor is a 12 tooth Drive Gear that is permanently attached to the Index Motor Rotor Shaft. This Gear is in mesh with a Pinion Face Gear. The Pinion Face Gear has a smaller gear that meshes with a large gear of the Linespace Pinion Assembly. The Linespace Pinion Assembly has a small gear that is in mesh with the Gear surface of the Platen Knob Assembly. The Platen Knob is mechanically attached to the Platen. This series of gears provide the correct gear speed and torque to provide proper rotation of the platen.

When the Carrier Return Keybutton or appropriate Code function is depressed, the Electronics energizes the Index Motor to rotate the Platen the number of linespaces as determined by the operator's linespace selection (1, $1^1/_2$, or 2).

The Paper Release Lever holds the Paper Table so that Front and Rear Feed Rollers are against the bottom of the Platen to provide Paper Feed through friction when the Platen rotates. When the Paper Release Lever is pulled forward, the Paper Table drops slightly to remove the Feed Roller tension, which allows the operator to straighten a sheet of paper before printing.

SECTION 3

LUBRICATION & CLEANING

INDEX

Subject	Page Number
General Lubrication Procedure	3-1
Cleaning Procedures	3-2
Lubrication Points	3-3

GENERAL LUBRICATION PROCEDURE

The main illustration points for Electronic Typewriters are illustrated and listed beginning on page 3-3. Each lubrication point is indicated with an arrow and a reference number, which indicates the lubricant used at that point. The following lubricants are required:

Reference Number	Description	Part Number
1	Dow #200 Silicone	4822 390 10112
2	VW-1222 Grease	4822 390 20137
3	Mobil FM2 Grease	4822 390 20138
4	Anderol 465	4822 390 10113
5	Dow #111 Silicone	4822 390 20135
6	Never-Seez Grease	4822 390 20136
7	Nyogel	4822 390 20134

Important: *The Control PC Board and Transformer should be kept free of dirt, grease, and oil.*

CLEANING PROCEDURES

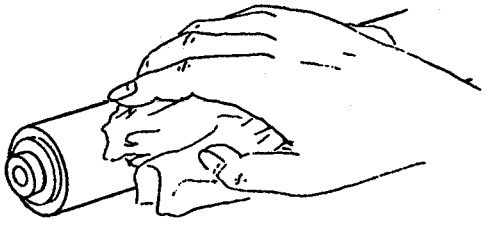
Cleaning procedures for machine parts and recommended cleaning solutions are outlined below.

Do not, under any circumstances, use an air hose or chemical cleaner to clean an Electronic Typewriter. Debris and chemical residue can impair the function of electrical components. If an internal part requires cleaning, wipe that part clean with clean, dry cloth.

Caution: When cleaning with recommended cleaning solutions, Take care that no liquid drips or splashes onto internal parts. Keep all solvents and petroleum distillates away from electrical components.

Platen

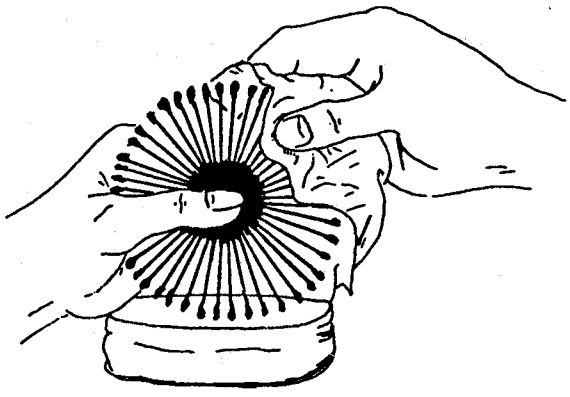
Remove Platen (see Removals). Soak a clean cloth with rubbing alcohol, and wipe the Platen surface to remove dust, dirt, and ink. Note: If the Platen is not removed, **do not** use alcohol: use a household cleaner.



Print Element

Dip the Print Element Petals into a container of rubbing alcohol, and wipe dry with a clean cloth.

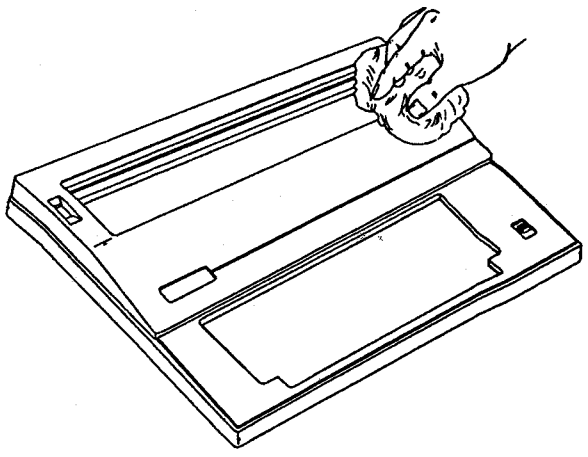
Do not soak the Print Element in the alcohol.



Jackets

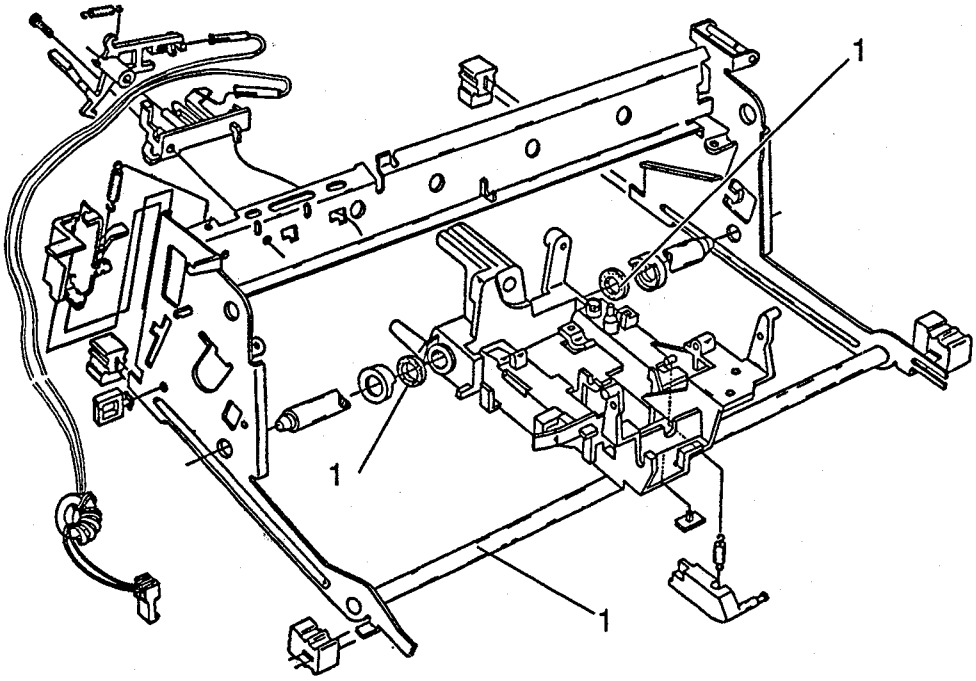
Remove Jackets and wipe clean with a sponge soaked in a mild ammonia or soap solution.

Do not use any cleaning solutions which contain chlorinated compounds.

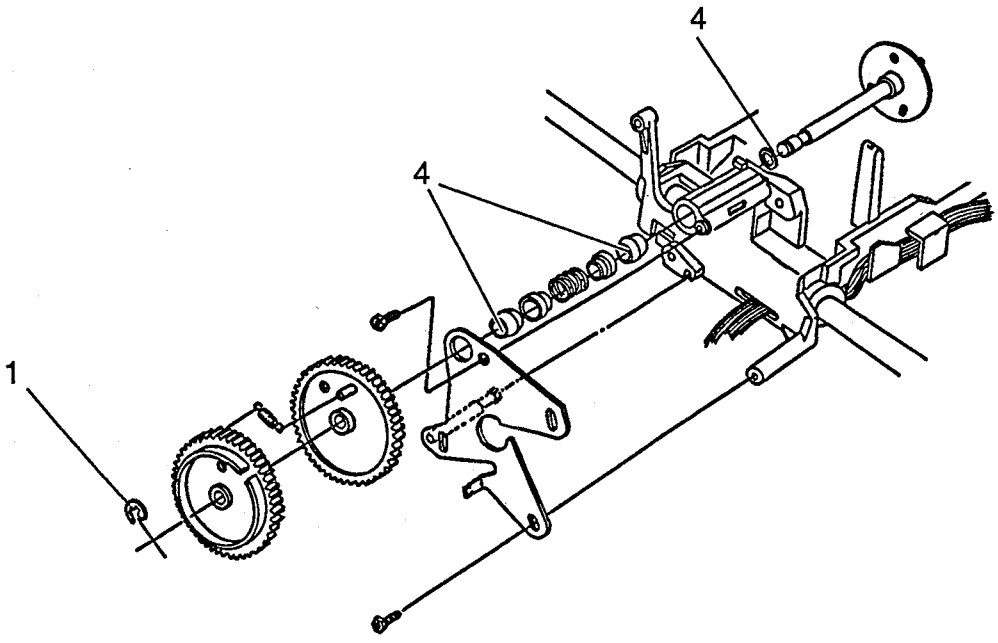


LUBRICATION POINTS

CARRIER RAILS



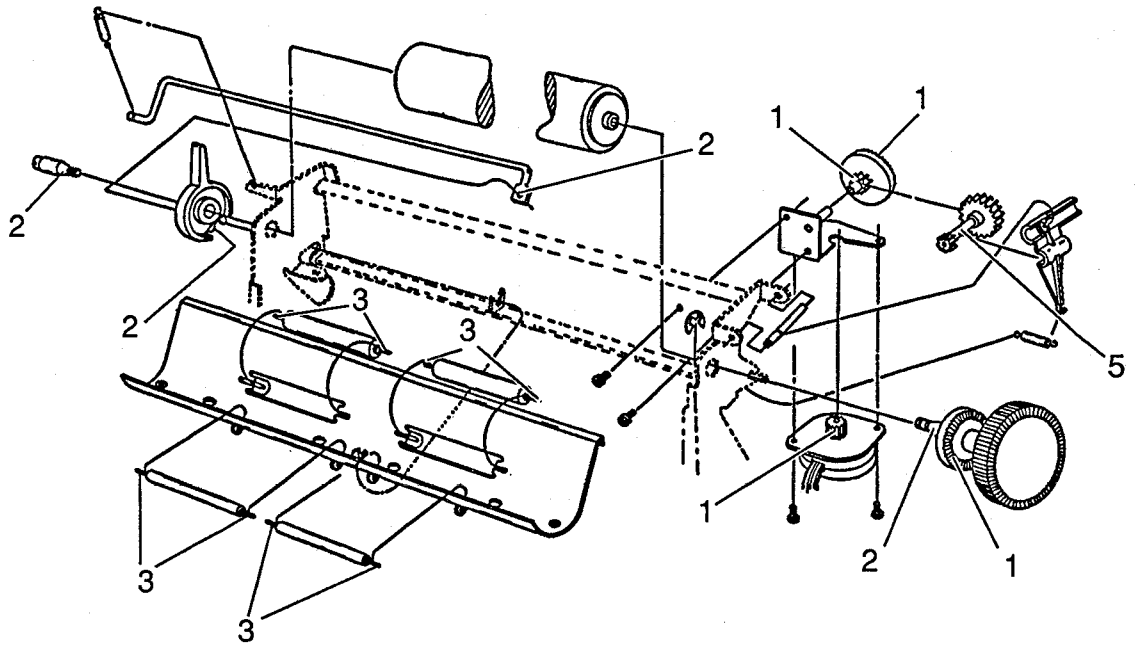
ELEMENT DRIVE



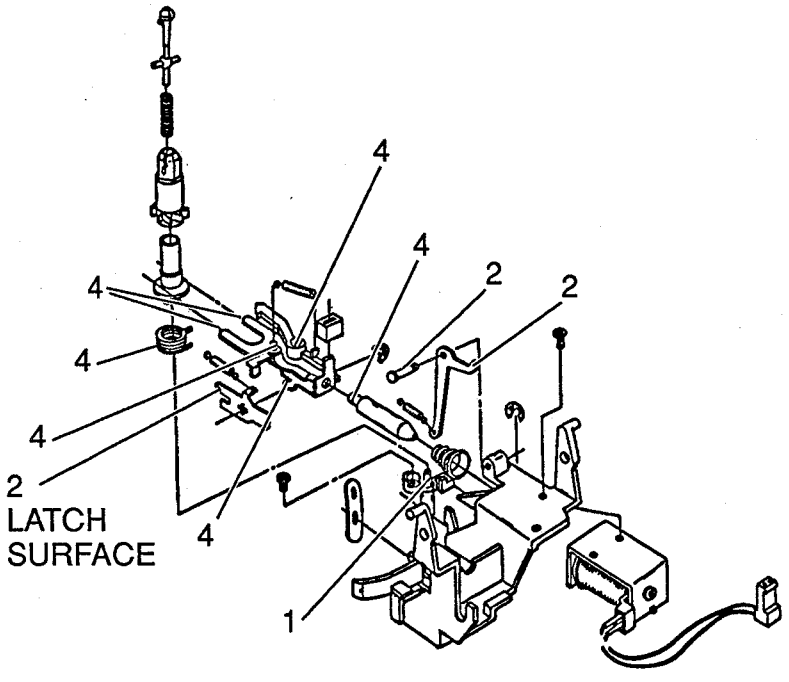
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

PAPER FEED



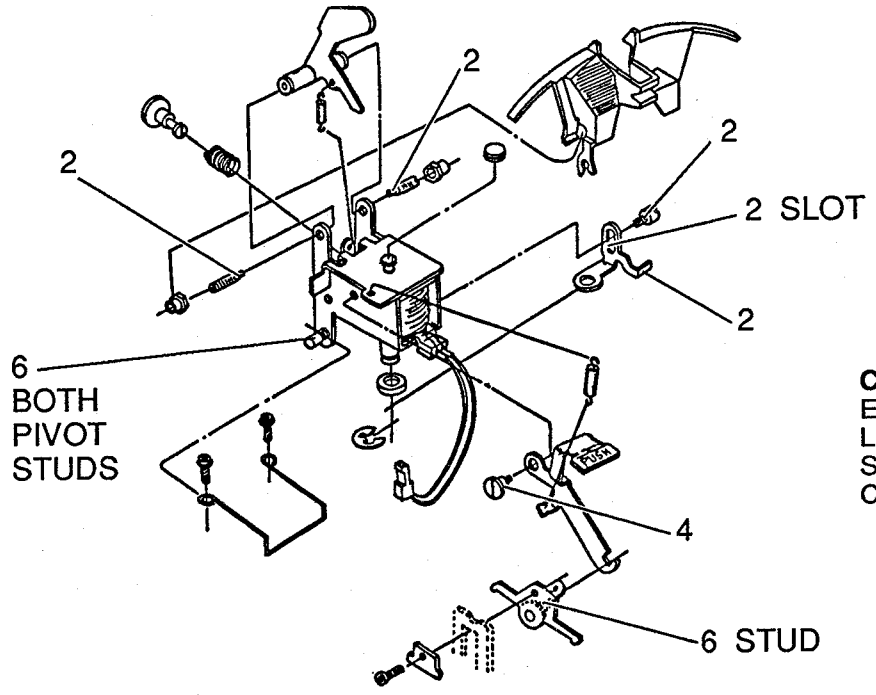
RIBBON DRIVE



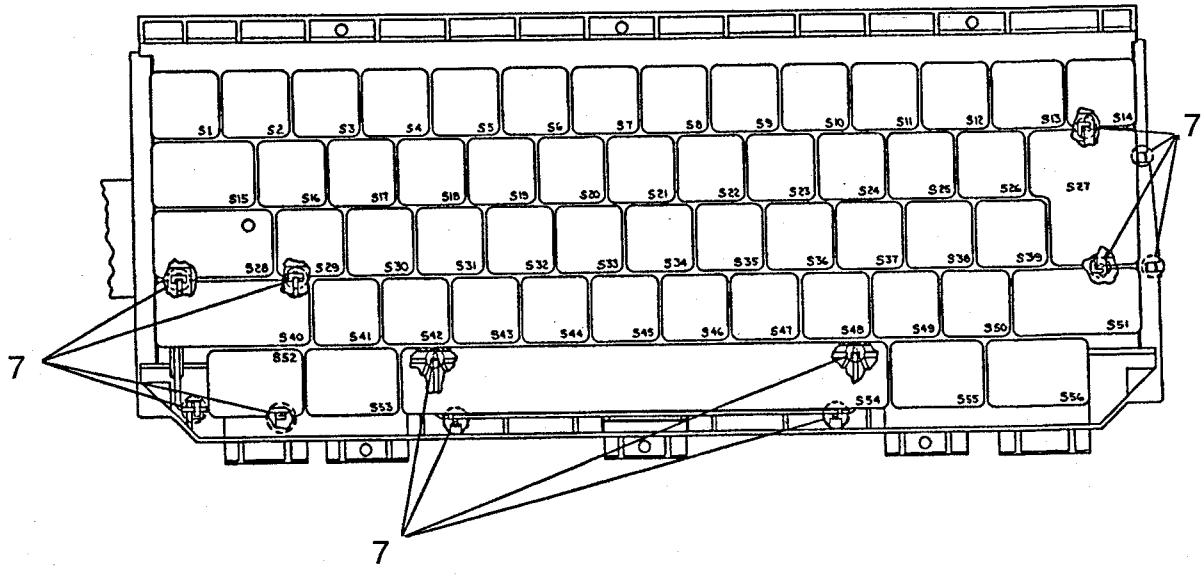
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

HAMMER



KEYBOARD



REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

SECTION 4

REMOVALS

General Procedure: All removals should be performed with power cord unplugged and machine at rest. Prior removal of particular groups of parts is indicated in each removal procedure as required.

When adjustments are broken during a removal, those adjustments are indicated at the bottom of the procedure, and are referenced to adjustment numbers in the Adjustment Section. Refer to the Branch Display on page 5-1 for sequential relationships among adjustments.

OBSERVE STATIC PRECAUTIONS

Removals of PC Boards and other static sensitive parts are marked as above. Be extremely careful when handling these parts as static electricity can cause irreparable damage to static sensitive devices.

SECTION 4

REMOVALS

INDEX

	Subject	Page Number
1.	Mask Removal	4-3
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3.	Control PC Board Removal	4-4
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5.	Transformer Assembly Removal	4-6
6.	Element Motor Removal	4-7
7.	Element Drive Shaft and Bearings Removal	4-8
8.	Platen and Paper Table Removal	4-9
9.	Ribbon Mechanism Removal	4-10
10.	Hammer Solenoid Assembly Removal	4-11
11.	Correction/Cassette Ribbon Solenoid Removal	4-12
12.	Linespace Motor Removal	4-12
13.	Keyboard Component Removals	4-13
14.	Keyboard Keybutton Removals	4-14
15.	Correction Bail Removal	4-15
16.	Carrier Motor and Carrier Rack Drive Assembly Removal	4-16
17.	Carrier Molding Removal	4-17

1. Mask Removal

1. Remove four Screws (2).

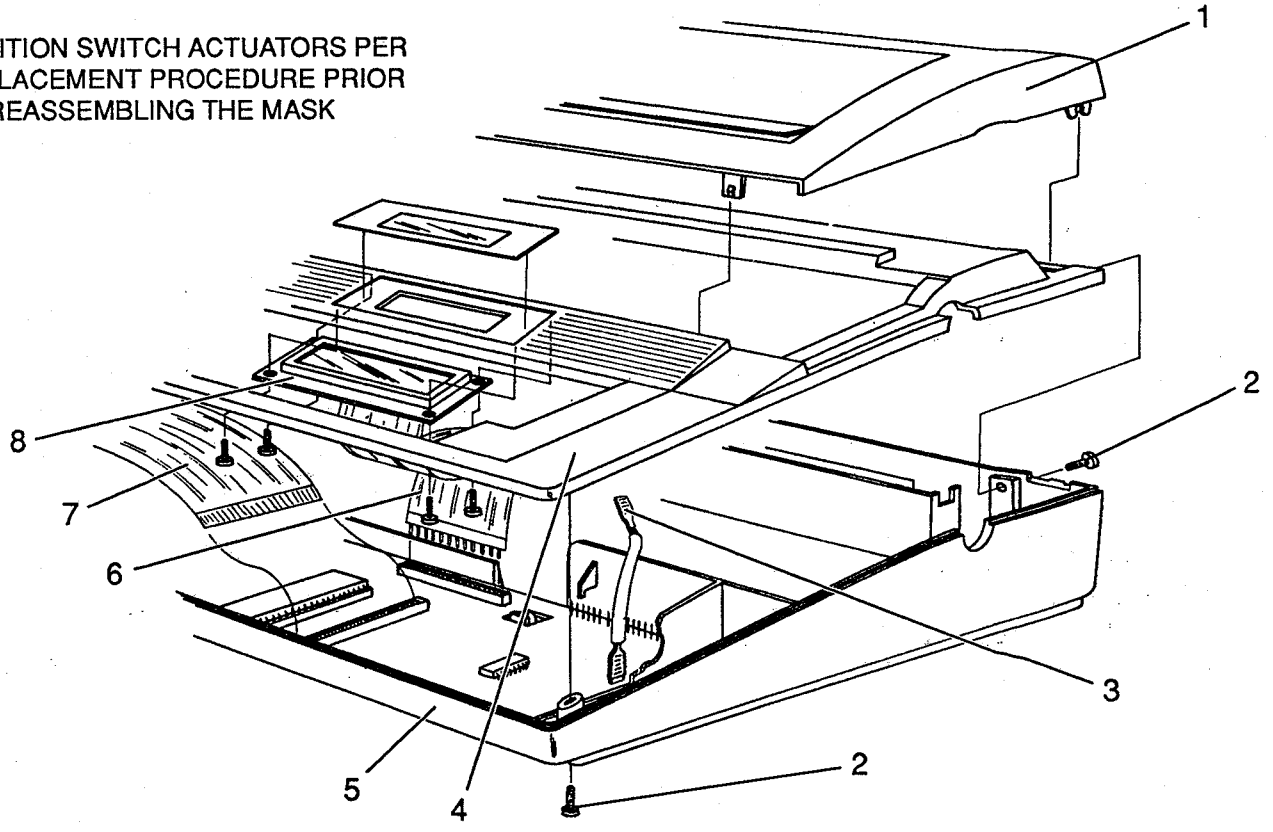
2. Raise front of Mask (4) to disconnect Keyboard Flexible Cable (7) from Control PC Board. On LCD models, disconnect LCD Cable Connector (6) from Control PC Board. Also disconnect left and right Keyboard Ground Cables (3) from Keyboard. Lift off Mask (4). **Note:** Rear of Deck (1) can be snapped off Mask, and LCD (8) can be unscrewed from Mask.

3. Remove Control PC Board, Frames, and Transformer Assembly (see Removals Index) to remove Casing Base (5).

Replacement: Reverse procedure. Move Paper Release Lever forward before placing Mask (4) on Casing Base (5). *On LCD Models*, move Switch Actuators to the "Type" and "Off" positions before installing Mask to the Casing Base. *On non-LCD Models*, move Switch Actuator to the "Off" position. Position rear of Mask on Casing Base while holding front of Mask up from Base. Reconnect Keyboard Ground Cables (3) and Keyboard Flexible Cable (7). Carefully place front of Mask on Casing Base to prevent damaging Switch Contacts, and assemble bottom and rear Screws (2). Move Paper Release Lever rearward to its normal position.

OBSERVE STATIC PRECAUTIONS

POSITION SWITCH ACTUATORS PER REPLACEMENT PROCEDURE PRIOR TO REASSEMBLING THE MASK



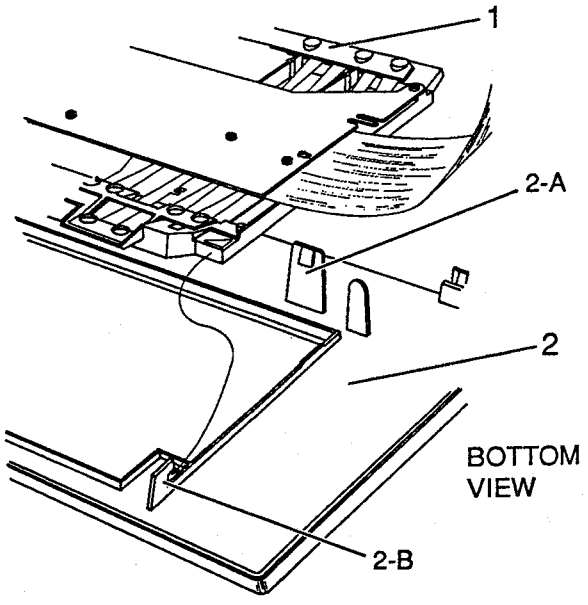
2. Keyboard Removal

1. Remove Mask and turn upside down (see Mask Removal).

2. Unsnap rear Keyboard Frame (1) from Left and Right Supports (2-A).

3. Lift Rear of Keyboard (1) up and slide Keyboard rearward from front Posts (2-B). Remove Keyboard.

Replacement: Reverse procedure.



OBSERVE STATIC PRECAUTIONS

3. Control PC Board Removal

1. Remove Mask (see Mask Removal).

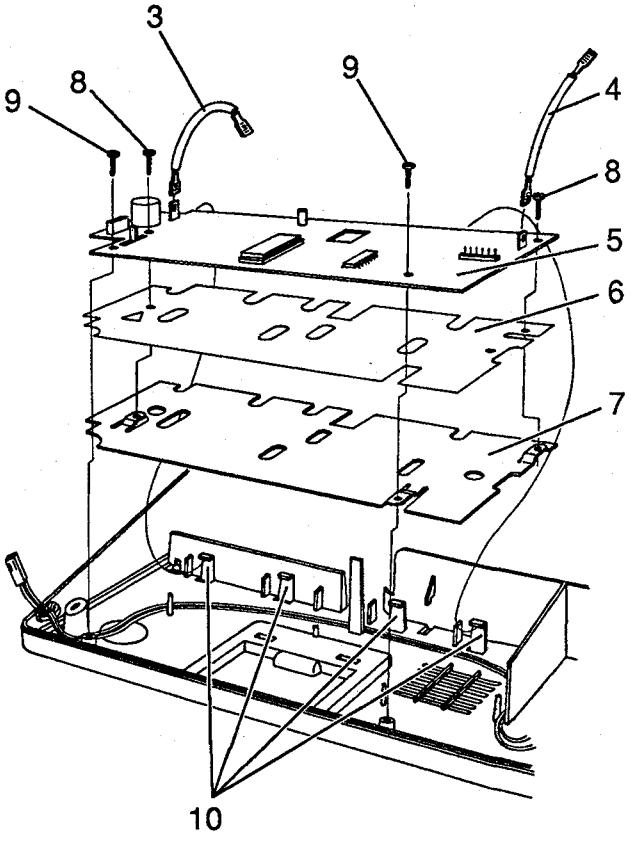
2. Disconnect Ground Cables (3 & 4) from PC Board Ground Tabs.

3. Disconnect Left End Switch, Right Ribbon Switch, Ribbon Solenoid, Hammer Solenoid, Element Motor, Carrier Motor, Transformer, and Index Motor Connectors.

4. Remove Screws (9), and lift out Control PC Board (5).

5. *On Dictionary Models*, remove Insulator (6), and Shield (7) by removing Screws (8).

Replacement: Reverse procedure. Make sure rear of PC Board is under Lugs (10). Refer to Wiring Diagram for connections to PC Board.

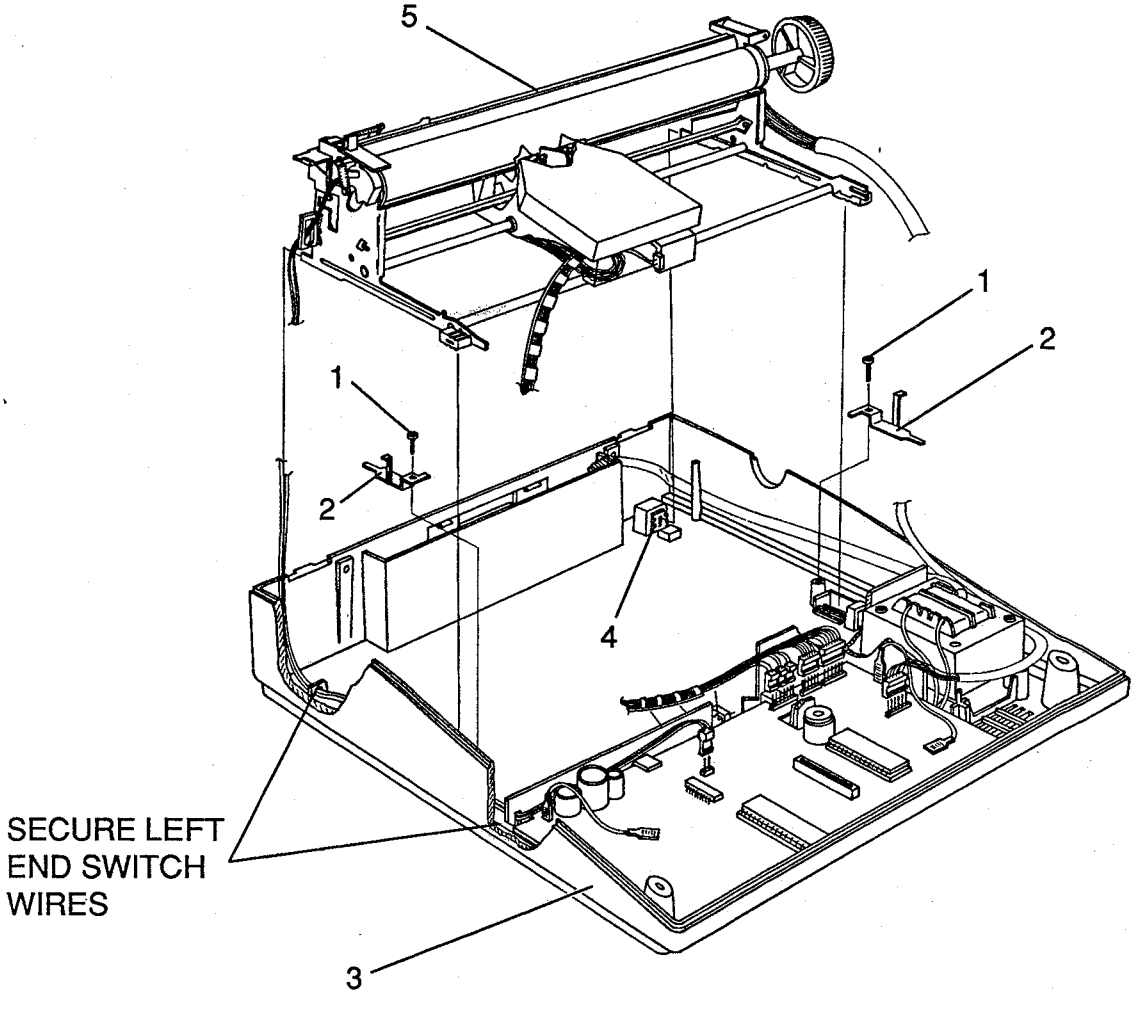


4. Frame Assembly Removal (with Carrier & Paper Handling)

1. Remove Mask (see Mask Removal).
2. Remove two Screws (1) and two Foot Retainers (2) from Casing Base.
3. Disconnect the Connectors for Left End Switch, Right Ribbon Switch, Ribbon Solenoid, Hammer Solenoid, Element Motor, Carrier Motor, and Index Motor from Control PC Board.
4. Remove Spiral Harness, Left End Switch, and Index Motor Wires from Casing Base (3).
5. Lift Frame Assembly (5) out of Casing Base (3) by pivoting front of Assembly up. **Note:** This requires some force since the fit is tight. The two rear Feet (4) of the Frames can remain in the Casing Base.

Replacement: Reverse procedure. Secure the Left End Switch Wires in the Casing Base as illustrated below. Refer to Wiring Diagrams for connections to the PC Board.

OBSERVE STATIC PRECAUTIONS

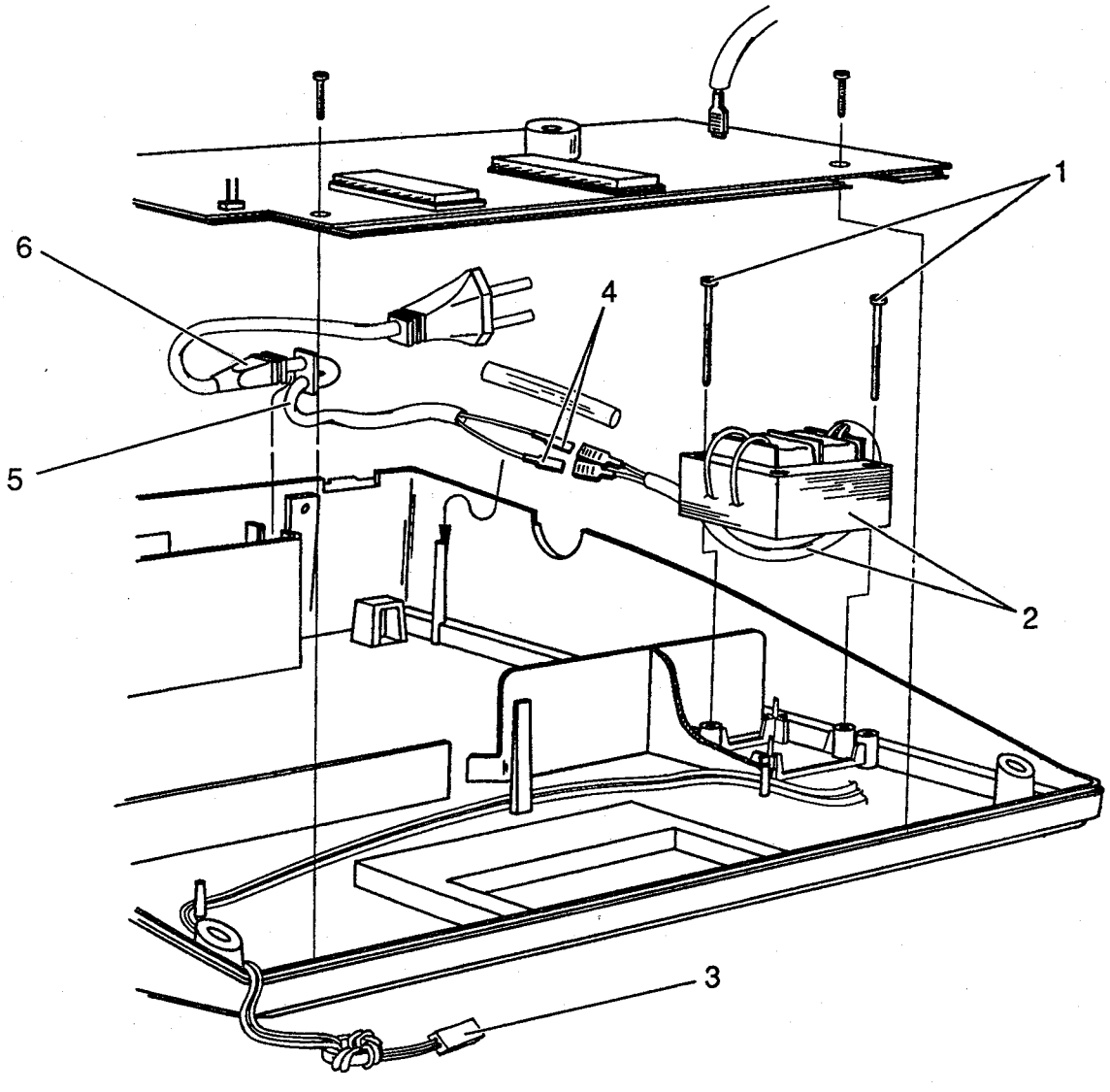


5. Transformer Assembly Removal

1. Remove Mask and Frame Assembly (see Removals Index).
2. Disconnect Connector (3) from Control PC Board.
3. Remove two Screws (1) from Transformer.
4. *On Dictionary Models only*: Remove Control PC Board (see Removal Index).
5. Lift out Line Cord Strain Relief (6) from Casing Base, and lift out Transformer Assembly.
6. *On International Models only*: Disconnect two Connectors (4) to separate Line Cord (5) from Transformer Assembly (2).

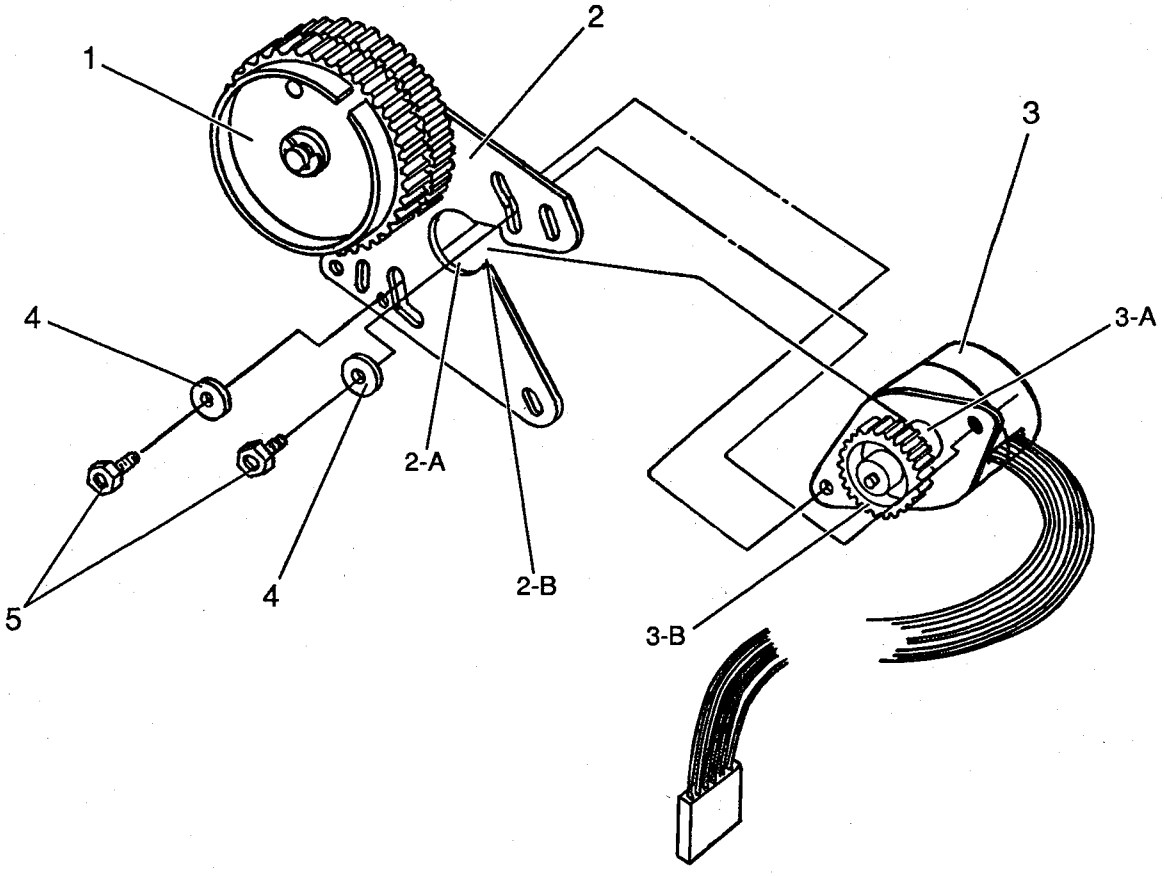
Replacement: Reverse procedure. **Note:** Transformer sets on Keyed Studs of Casing Base for easy locating.

OBSERVE STATIC PRECAUTIONS



6. Element Motor Removal

1. Remove Frame Assembly (see Removals Index).
2. Remove two Screws (5) and two Washers (4).
3. Push Element Motor (3) forward to disengage Bearing (3-A) from Hole (2-A) in Motor Bracket (2), and slide Motor out through Slot (2-B).



Replacement:

A) Wind Element Scissor Gears (1) against spring tension and hold Gears.

B) Slide Element Motor (3) through Bracket Slot (2-B), and push Motor (3) rearward so Bearing (3-A) seats in Bracket Hole (2-A) while making sure Drive Gear (3-B) meshes with Scissor Gears (1). Release Scissor Gears after Bearing is seated and Gears are meshed. Hold Element Motor in place and reinstall two Washers (4) and two Screws (5).

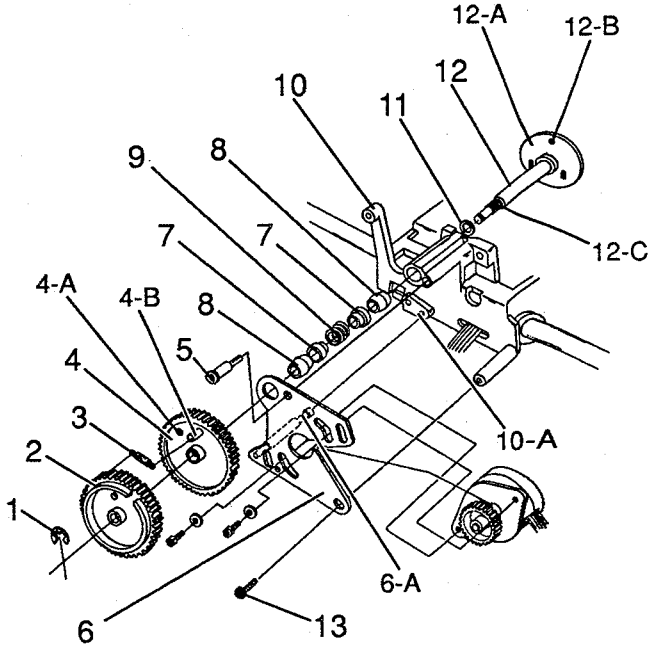
Adjustments Broken: Element Motor Position (Adjustment #1).

7. Element Drive Shaft and Bearings Removal

1. Remove Element Motor and Hammer Solenoid Assembly (see Removals Index).
2. Remove E-Ring (1), Outer Scissor Gear (2), and Spring (3).
3. Pry off Inner Scissor Gear (4). **Note:** This Gear must be replaced with a new one after prying it off.
4. Remove two Screws (5) & (13).
5. Pivot Stud (6-A) out of Slot (10-A) in Carrier Molding (10), and remove Bracket (6), Bearing Retainers (7), Bearings (8), Spring (9), Washer (11), and Element Drive Shaft Assembly (12). ***Caution: Carefully remove Bracket (6) to overcome Spring (9) tension.***

Replacement:

A) Insert Element Drive Shaft (12) with Washer (11) through Drive Shaft Hole in Carrier Molding (10).
B) Reassemble Bearings (8), Spring (9), Bearing Retainers (7), and Bracket (6) on Drive Shaft. **Note:** Smaller diameter of Bearings (8) fit into Retainers (7). Shoulder End of Retainers (7) seats in Spring (9).
C) Replace two Screws (5) & (13).
D) Rotate Drive Disc (12-A) so that Round Hole (12-B) is at 12 o'clock position. Hold new Inner Scissor Gear (4) with Hole (4-A) at about 11 o'clock position as viewed from the rear (arrow molded inside gear should be parallel with the Rear Frame crosspiece), and press Gear onto Drive Shaft until it bottoms on Drive Shaft Shoulder (12-C). **Note:** This positioning assures that Element Motor will be within adjustment range when reassembled.
E) Assemble Spring (3) to Inner Gear Spring Anchor (4-B) with other Spring Loop facing Hole (4-A). Place Outer Gear (2) on Shaft (12), hook Spring Loop with Outer Gear Spring Anchor, and twist Gears until Spring Anchors fit in Gear Holes: Assemble E-Ring (1).
F) Replace Hammer Solenoid Assembly.
G) Replace Element Motor per Element Motor Replacement procedure.

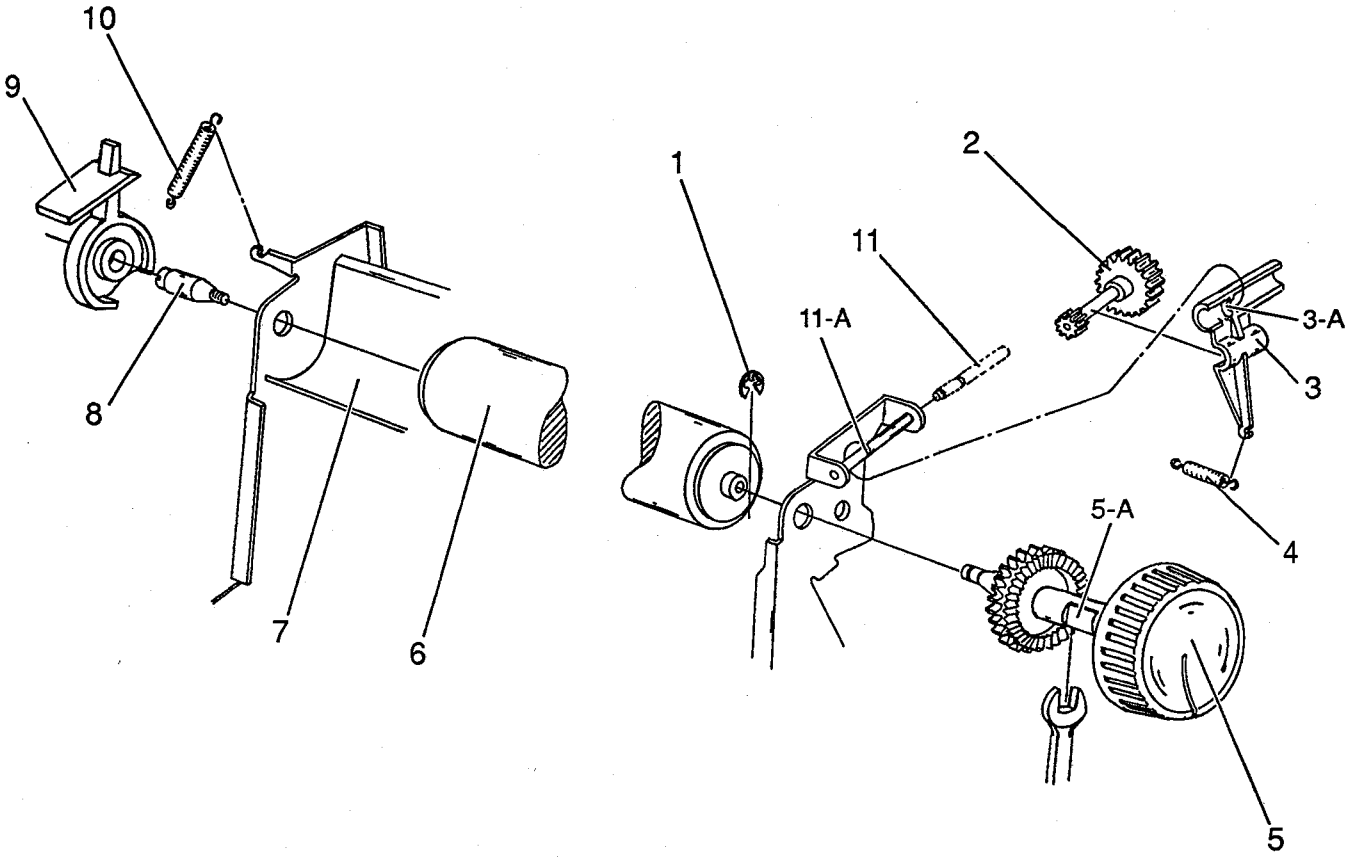


Adjustments Broken:
Element Motor Position (Adjustment #1).

8. Platen and Paper Table Removal

1. Remove Mask and Frame Assembly (see Removals Index).
2. Unhook Spring (4) from Linespace Pinion Pivot (3). Remove Pivot (3) and Linespace Pinion Assembly (2). **Note:** Pin (11) may fall free.
3. Unhook Spring (10) and remove Paper Release Lever (9).
4. Remove E-Ring (1).
5. Hold Platen Knob (5) with a 3/8" wrench over square portion of Knob Shaft (5-A) and remove Screw (8). **Note:** If you simply hold right Platen Knob (5), it will likely break when loosening Screw (8).
6. Hold Platen (6) and remove Platen Knob (5).
7. Lift out Platen (6) and Paper Table (7).

Replacement: Reverse procedure. **Note:** Formed Tab in Paper Table seats in Hole of Paper Release Shaft, and Flange (3-A) in Pinion Pivot seats in Groove (11-A) of Pin.



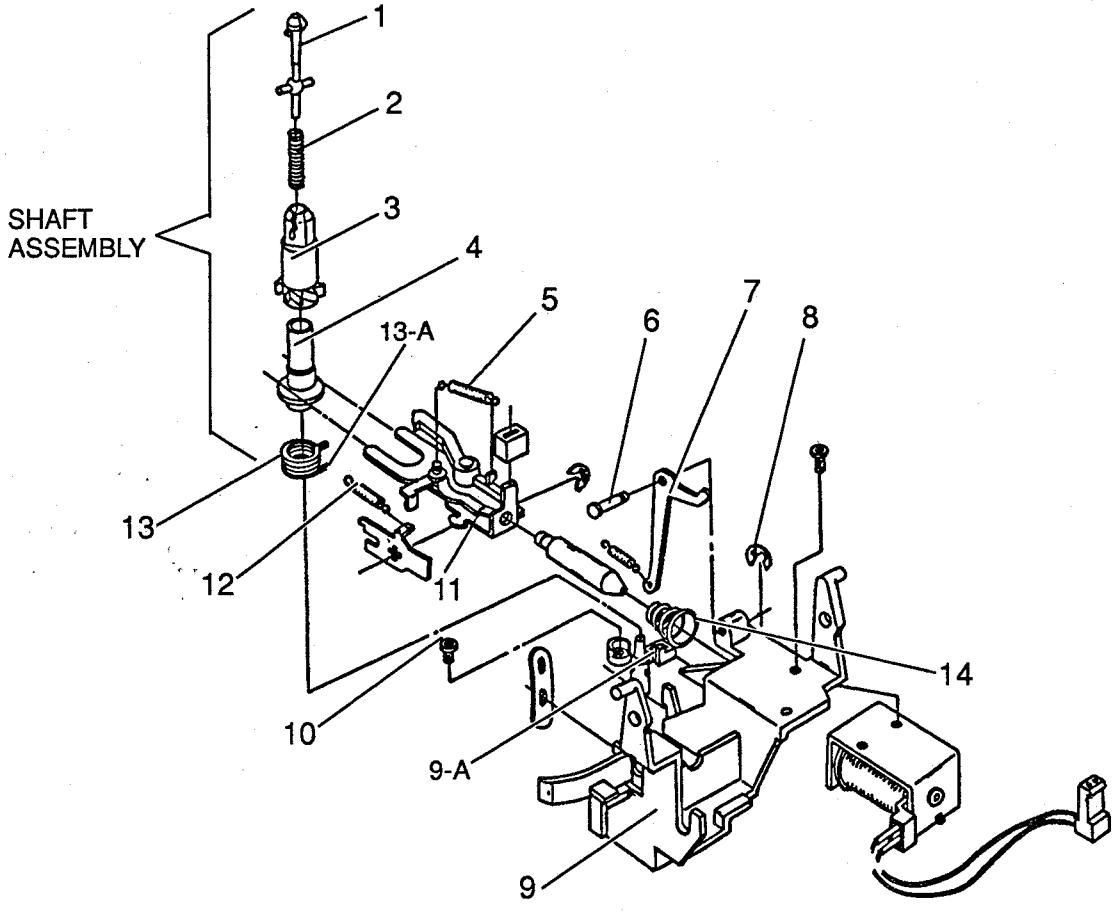
9. Ribbon Mechanism Removal

Note: Ribbon Driver (1) may be removed from Ribbon Driver Assembly with no other removals by pulling it straight up out of Assembly with a pair of Needle Nose Pliers. Spring (2) may fall free. Use Needle Nose Pliers to replace Ribbon Driver (1).

1. Remove Frame Assembly, Correction Bail, and Correction/Cassette Ribbon Solenoid (see Removals Index).
2. Remove Screw (10), E-Ring (8), Stud (6), and Correction Lift Bellcrank (7).
3. Lift out Ribbon Shaft Assembly from Carrier Molding (9).
4. Remove Ribbon Drive Ratchet Hub (3) from Ribbon Feed Shaft (4) by pulling apart.
5. Remove Anti-Backup Feed Spring (13) from Ribbon Feed Shaft (4).
6. Remove Ribbon Feed Spring (5) and Black Latch Spring (12) from Ribbon Feed Assembly (11).

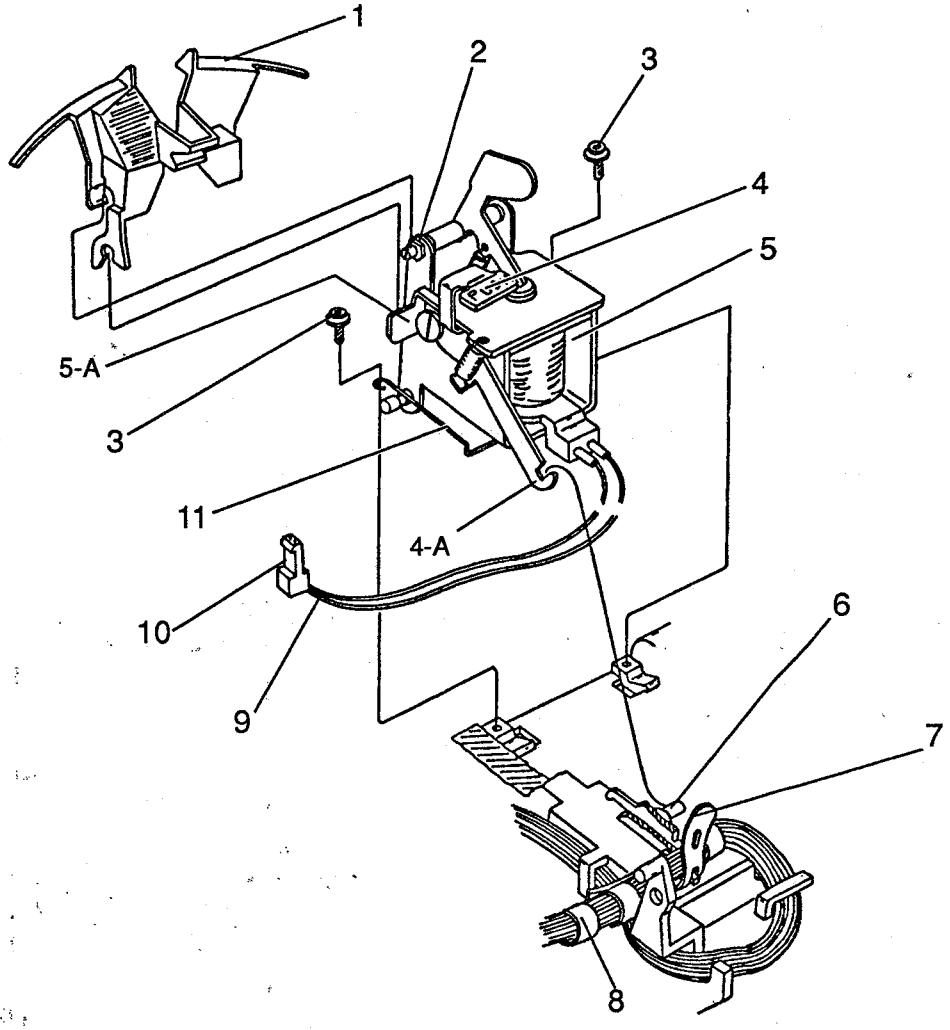
Replacement: Reverse procedure. Note: Spring Tab (13-A) seats in molded Notch (9-A) in Carrier Molding (9). Also, make sure Solenoid Spring (14) is installed as shown in illustration.

Adjustments Broken: Correction Cassette Lift Adjustment (Adjustment #6).



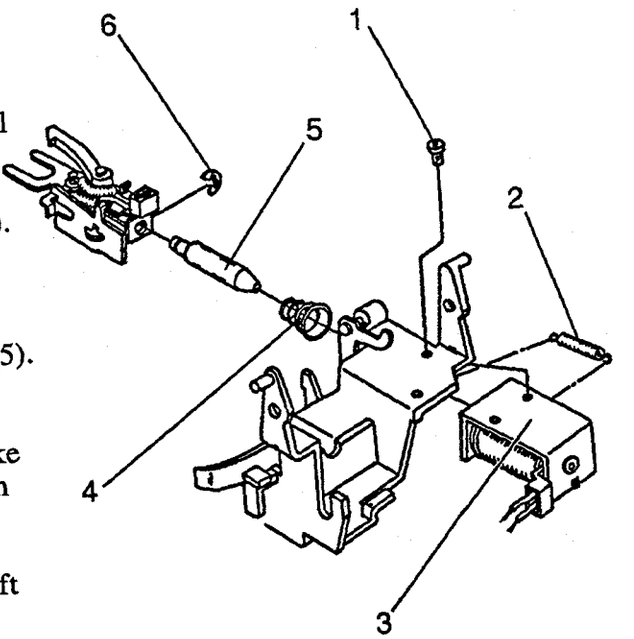
10. Hammer Solenoid Assembly Removal

1. Remove Correction Bail (see Removals Index).
2. Remove Ribbon Guide (1) from left and right Hammer Pivot Nuts (2) and Ear (5-A).
3. Unhook Wire Strap (7) from Carrier.
4. Remove two Screws (3) and Retaining Wire (11).
5. Press Push Lever (4) downward slightly, and lift Hammer Solenoid Assembly (5) out of Carrier.
6. Remove two Hammer Wires (9) from spiral Wire Binder Retainer (8).
7. Disconnect Hammer Solenoid Connector (10) from Control PC Board.



Replacement: Reverse procedure. Formed area of Retaining Wire fits under Lip of Carrier Molding, and Stud (6) fits in Slot (4-A).

11. Correction/Cassette Ribbon Solenoid Removal

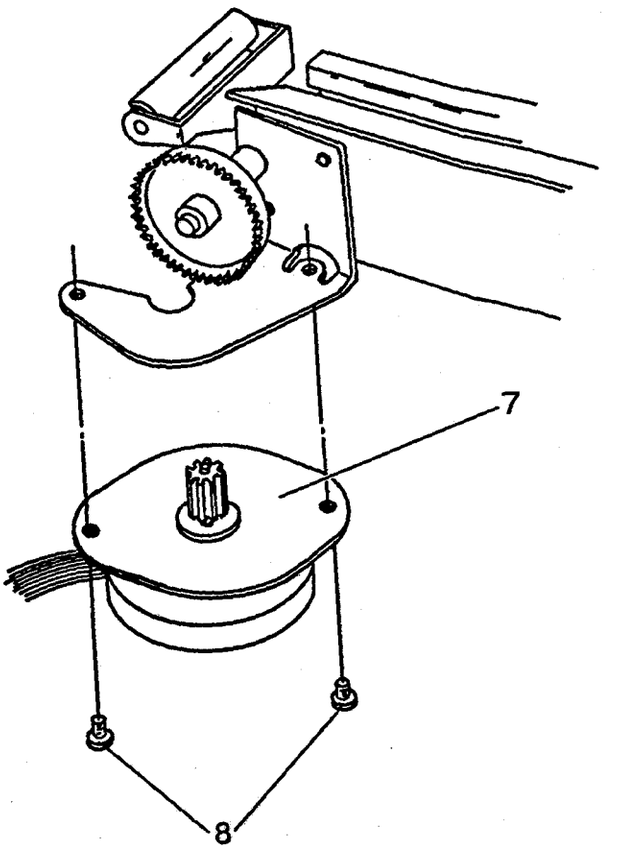


1. Remove Frame Assembly and Correction Bail (see Removals Index).
2. Unhook Spring (2) from Ribbon Solenoid (3).
3. Remove Screw (1) and lift out Solenoid.
4. Remove E-Ring (6) from Solenoid Plunger (5). Lift out Plunger (5) and Spring (4).

Replacement: Reverse procedure. Note: Make sure Solenoid Spring (4) is installed as shown in illustration.

Adjustments Broken: Correction Cassette Lift Adjustment (Adjustment #6).

12. Linespace Motor Removal



1. Remove Mask and Frame Assembly (see Removals Index).
2. Remove two Screws (8) and lift out Linespace Motor (7).

Replacement: Reverse procedure. Note: Make sure Motor Gear meshes with Intermediate Gear.

13. Keyboard Component Removals

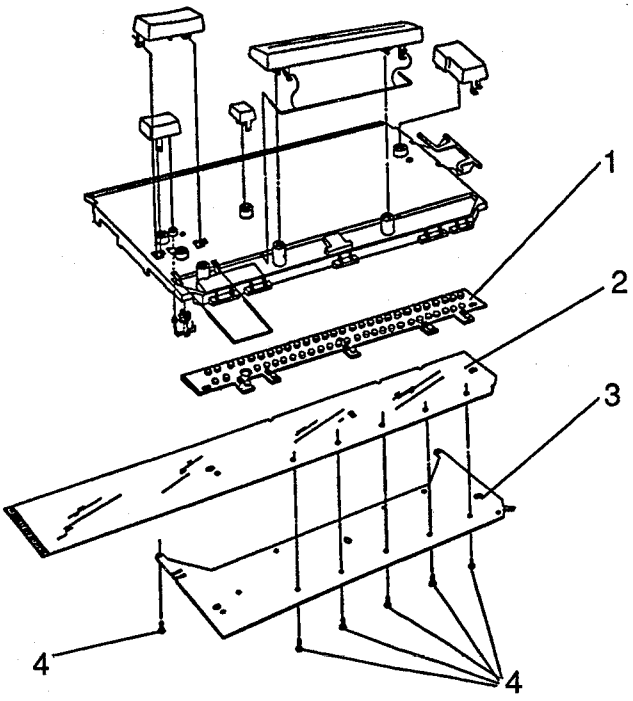
1. Remove Mask and Keyboard (see Removals Index).

2. With Keyboard upside down (Keybuttons facing down), remove Screws (4) and lift off Keyboard Base Plate (3).

3. Lift off Keyboard Flexible Circuit (2) and Molded Switches (1) from Keyboard.

4. Keybutton Removals: The Keybuttons on the Keyboard **cannot** be removed by prying up the Keybutton. See the following procedure.

Replacement: Reverse procedure.



Caution: Prying up on a Keybutton damages the Striker Spring. If a Striker Spring gets damaged, the entire keyboard must be replaced.

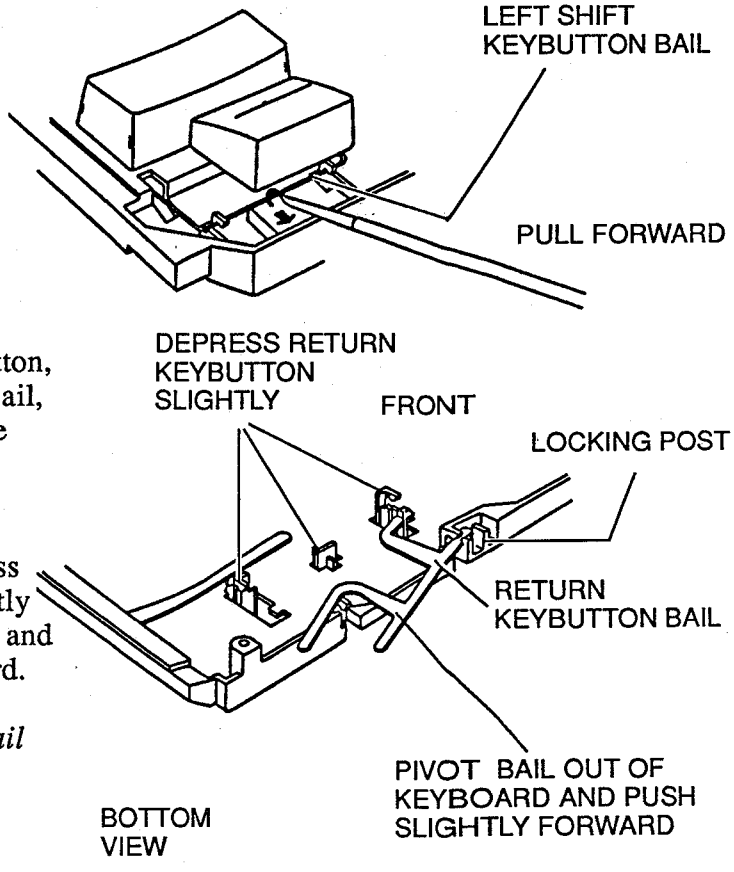
14. Keyboard Keybutton Removals

1. Remove the Keyboard from the Casing Base. Removal of the Keyboard Base Plate is not necessary, but the illustrations in this procedure show it removed.

2. When removing the Spacebar, Left Shift, or Return Keybutton, remove the Keybutton Bail next:

   A) For the Spacebar or Shift Keybutton, use a Spring Hook on the Wire Bail, and pull forward to disengage the Bail from the Keyboard and Keybutton.

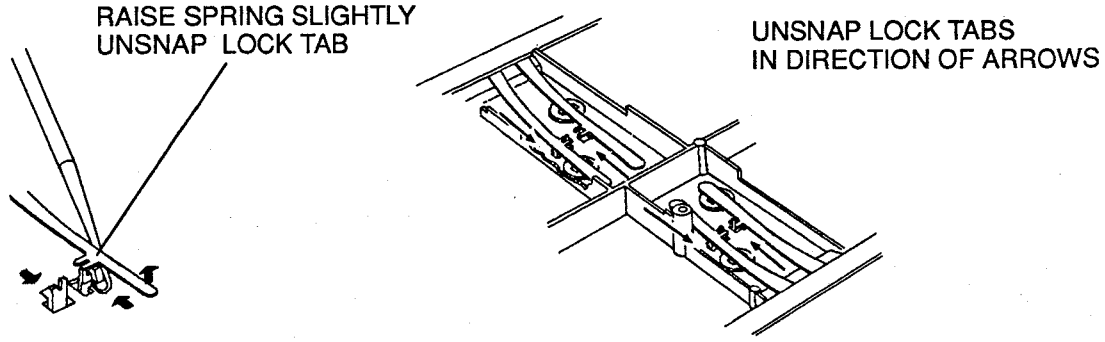
   B) For the Return Keybutton, depress the Keybutton slightly; push gently forward on the Sheet Metal Bail, and pivot the Bail out of the Keyboard. *Be careful not to damage the locking post when pushing the bail forward.*



Continued . . .

14. Keyboard Keybutton Removals (continued)

3. Turn the Keyboard upside down, and use a Spring Hook to raise the Striker Spring slightly to disengage it from the Keybutton. ***Caution: Do not raise the striker spring too far or the spring will get damaged.*** While holding the Spring away from the Keybutton, use the Spring Hook to unsnap the Keybutton Lock Tab from the Keyboard. The Keybutton drops out of the Keyboard Assembly. Note: The Spacebar has *two* Lock Tabs.

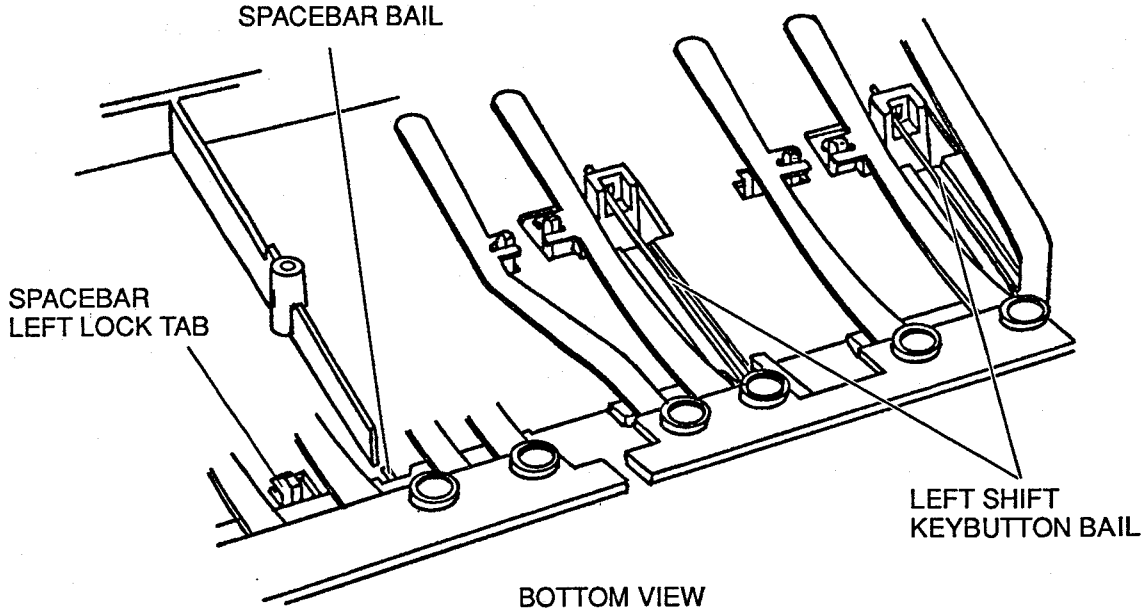


BOTTOM VIEW

Replacement:

A) Align the Keybutton with the holes in the Keyboard, and snap the Keybutton in place.

B) 1. When replacing the Spacebar or Left Shift Key Wire Bail, insert the Bail through the holes in the Keyboard. Make sure the ends of the Bail are properly aligned, and snap the front of the Bail into its locking tabs.



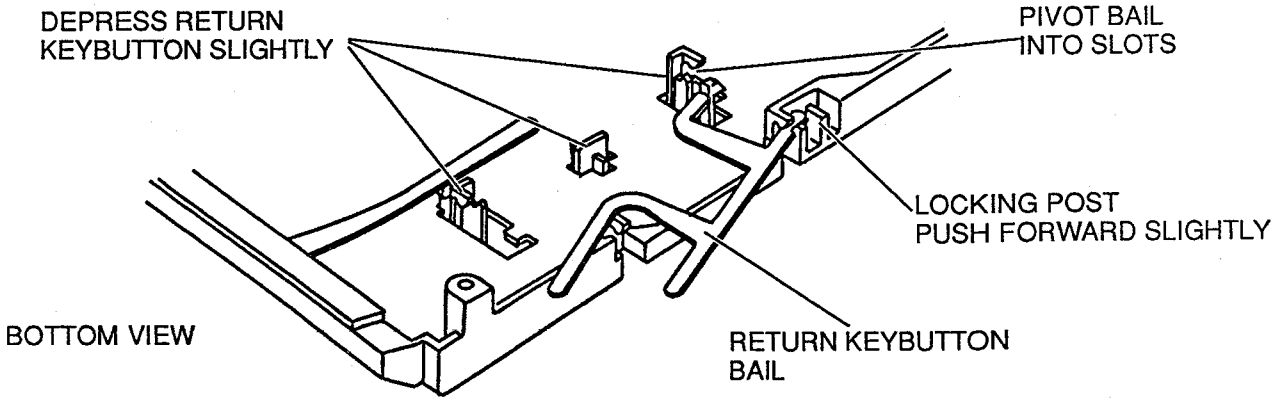
BOTTOM VIEW

Continued . . .

14. Keyboard Keybutton Removals

Replacement (continued):

B) 2. When replacing the Return Keybutton Sheet Metal Bail, depress the Keybutton slightly; gently push the end of the Bail slightly against the Keyboard post, and pivot the Bail into position. Make sure the Arms of the Bail seat in the Slots on the Keybutton.

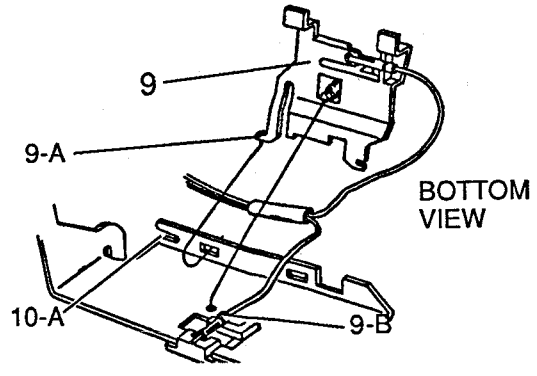


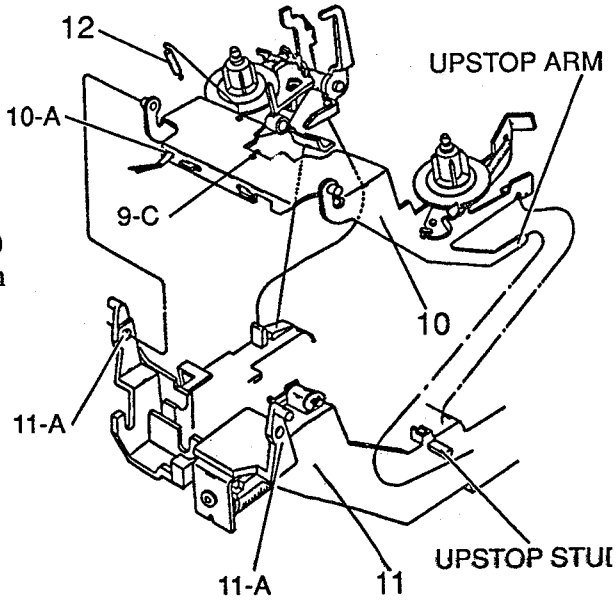
C) Replace the Keyboard in the Casing Base.

15. Correction Bail Removal

1. Remove Print Element, Ribbon Cassette, and Correction Cassette.
2. Unhook Spring (12) from Correction Bail.
3. Remove Correction Bail from Carrier by pushing out on Ribbon Cassette Pivot Mounts (11-A).
4. Remove Right Ribbon Switch wires from Slot (10-A) in Correction Bail.
5. Push Mount (9-A) on Right Ribbon Switch Lower Holder (9) towards center of Correction Bail and release from Bail.
6. Unhook Lower Switch Holder Spring (9-C) from Correction Bail. Rotate Lower Switch Holder so Holder is free from Correction Bail.
7. Disconnect Right Ribbon Switch Contact (9-B) from Upper Switch Holder. Lift out Correction Bail (10).

Replacement: Reverse procedure. Note: Make sure that Upstop Arm of Correction Bail is ***underneath*** Upstop Stud on Carrier.



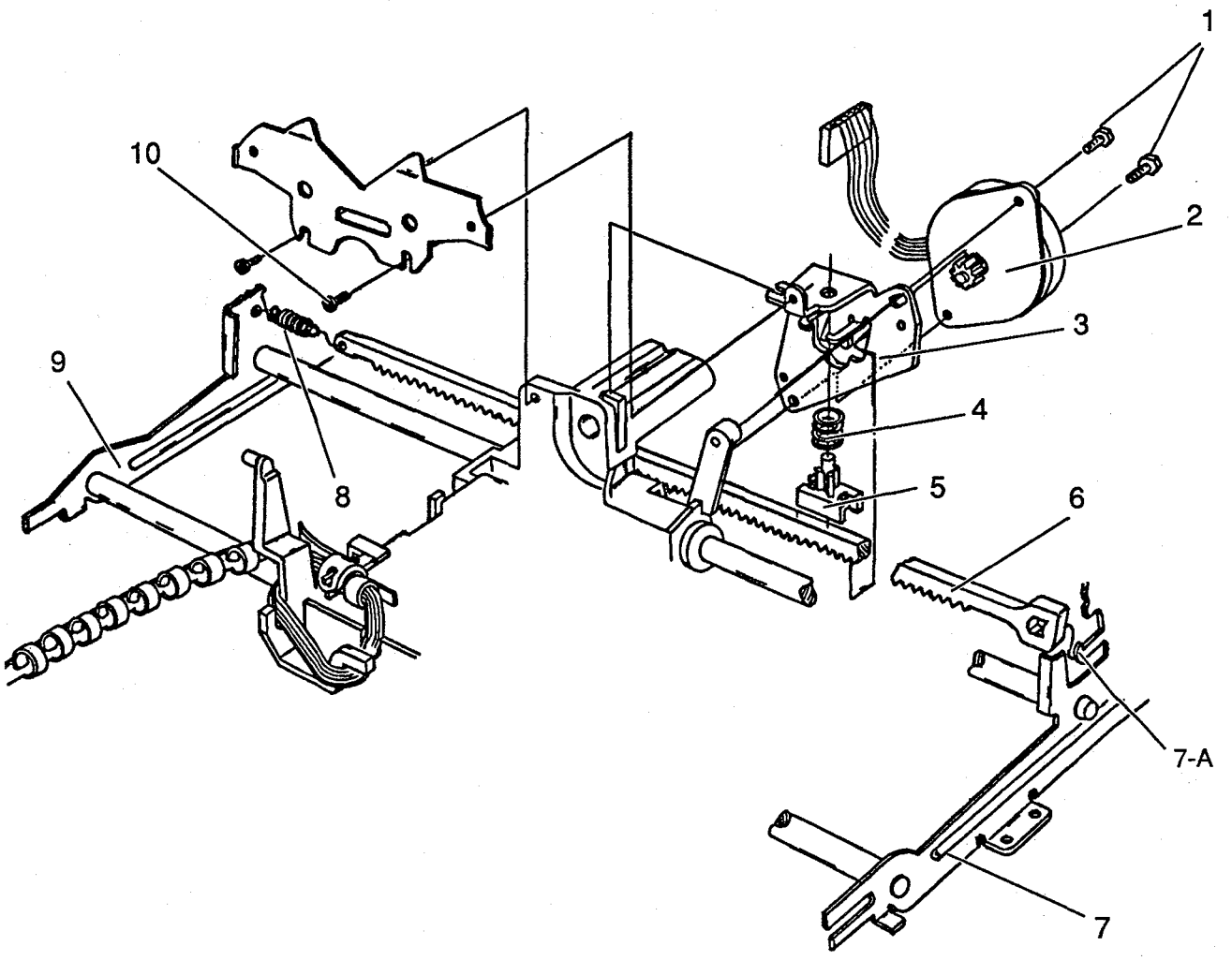


16. Carrier Motor and Carrier Rack Drive Assembly Removal

1. Remove Frame Assembly with Carrier Molding (see Removals Index).
2. Remove right Line Indicator Screw (10).
3. Remove two Screws (1).
4. Unhook Spring (8) from left Side Frame (9).
5. Remove Carrier Drive Rack (6) from Tab (7-A) on Right Frame, and lift out Carrier Return Bracket (3) and Carrier Motor (2). Remove Carrier Motor from Bracket.
6. Remove Slider (5) and Spring (4) from Carrier Return Bracket (3).

Replacement: Reverse Procedure.

Adjustments Broken: Line Indicator Position (Adjustment #7).

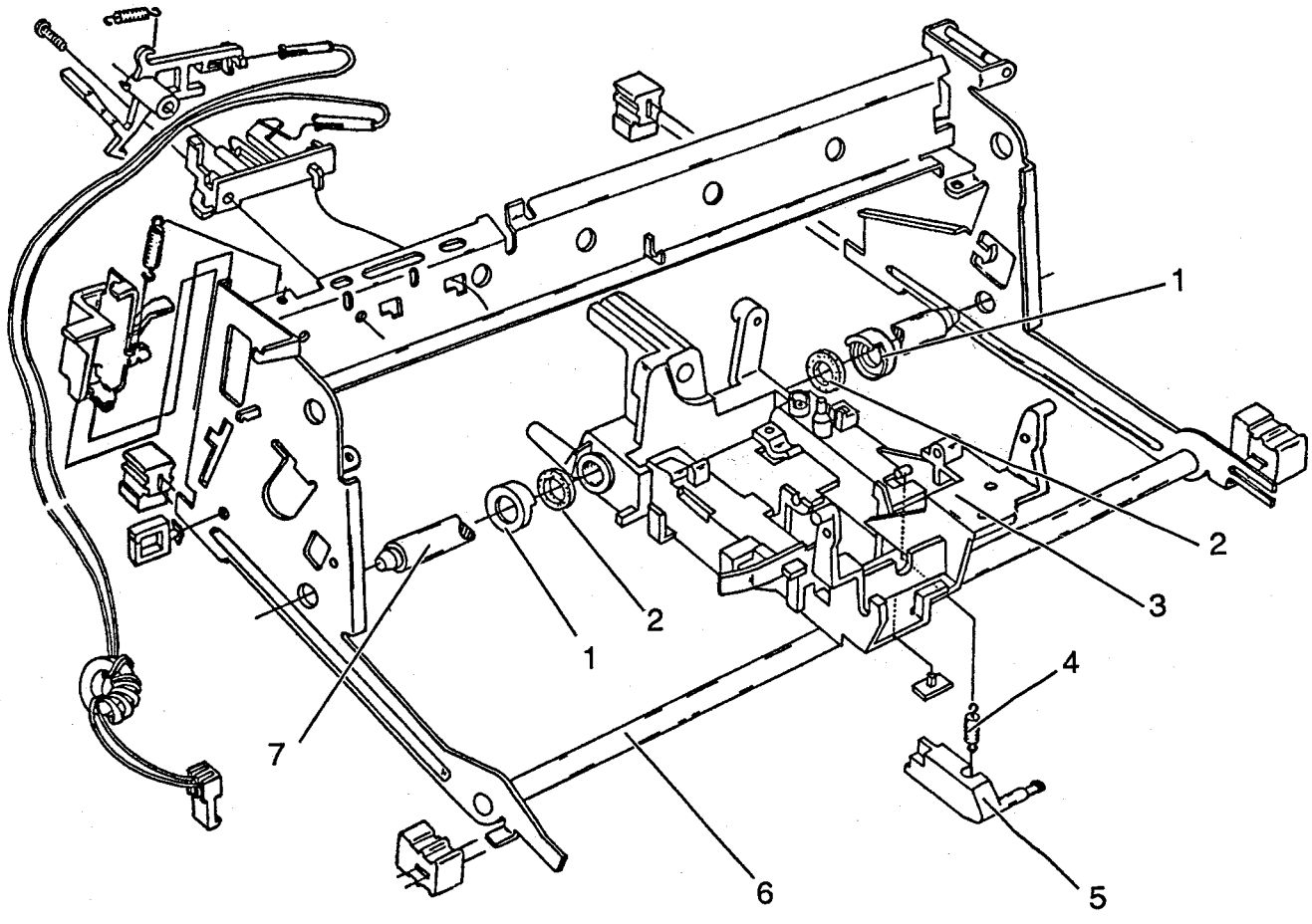


17. Carrier Molding Removal

1. Remove Frame Assembly, Rack Drive, Platen, and Paper Table (see Removals Index).
2. Spread Frames to disengage Rear Rail (7) from Frames.
3. Disengage Carrier Molding (3) from Front Rail (6), and slide Rear Rail (7) out of Carrier Molding.
4. Snap off two Felt Retainers (1), and remove two Felts (2).
5. Unhook Restraint Spring (4) from Carrier Molding (3) and remove Carrier Restraint (5).

Replacement: To replace Carrier Molding, remove all components from Molding (see Removals Index). Reverse procedures.

Adjustments Broken: 1, 3, & 7.



SECTION 5

ADJUSTMENTS

Adjustment Sequence Branch Display	Adjustment	Page Number
1 ↓ 2	1. Element Motor Position	5-2
	2. Hammer Center Position	5-3
3 ↓ 4	3. Hammer Assembly Position	5-4
	4. Ribbon Guide Position	5-4
5	5. Ribbon Cassette Position	5-5
6	6. Correction Cassette Lift	5-5
7	7. Line Indicator Position	5-6
8	8. Line Indicator Clearance from Platen	5-6

General Adjustment Procedure: Mask removal is required for access to most checks and adjustments. Additional access requirements are noted when applicable. All adjustments should be checked with Power Cord unplugged unless otherwise specified.

Circled reference numbers (i.e. (5)) in the illustrations indicate adjustment points.

The **Branch Display** above shows the relationships among adjustments. The arrow (⟶) means "*affects.*"

Example:

1
↓
2

Read this display as follows: 1 affects 2; 2 affects no other adjustment; 2 depends on 1 being correct.

Energizing Element Motor for Adjustments

Two adjustments require energizing the Element Motor. Hold down the "E" Keybutton with Lid Switch Actuator Spring unhooked (or Deck closed), and turn power on. Release the Keybutton when Carrier movement stops.

Non-LCD Models: The Shift LED flashes and the Element Motor stays energized for one minute. After one minute, the machine beeps and the Carrier moves to Space 12.

LCD Models: The Carrier stops at the Preset Left Margin, the machine beeps 3 times, displays "Alignment Test" in the LCD, and the Element Motor stays energized for one minute. After one minute, the machine beeps 3 times, displays "Test Complete" in the LCD, and returns to Type or Memory mode.

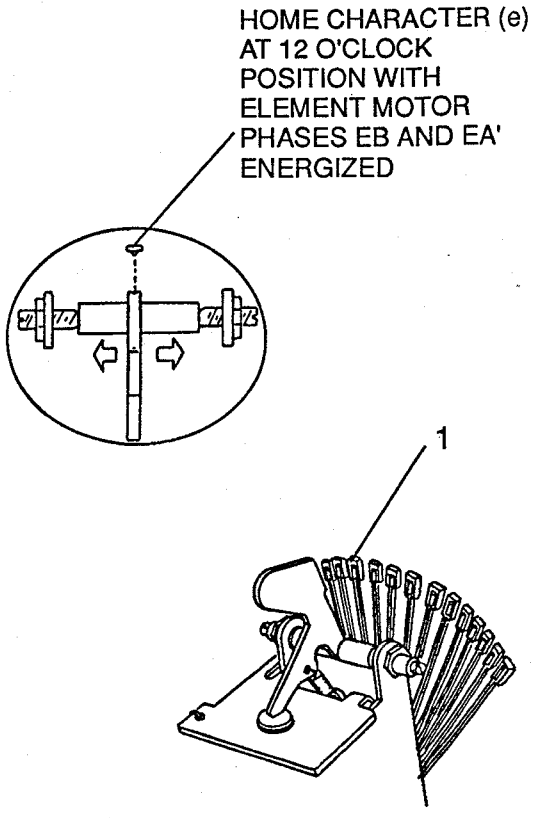
This procedure may be repeated as often as necessary to make the adjustment. **Note:** Because of the Right Ribbon Switch, a Ribbon Cassette *must* be installed on the Carrier to energize the Element Motor.

1. Element Motor Position

Requirement:

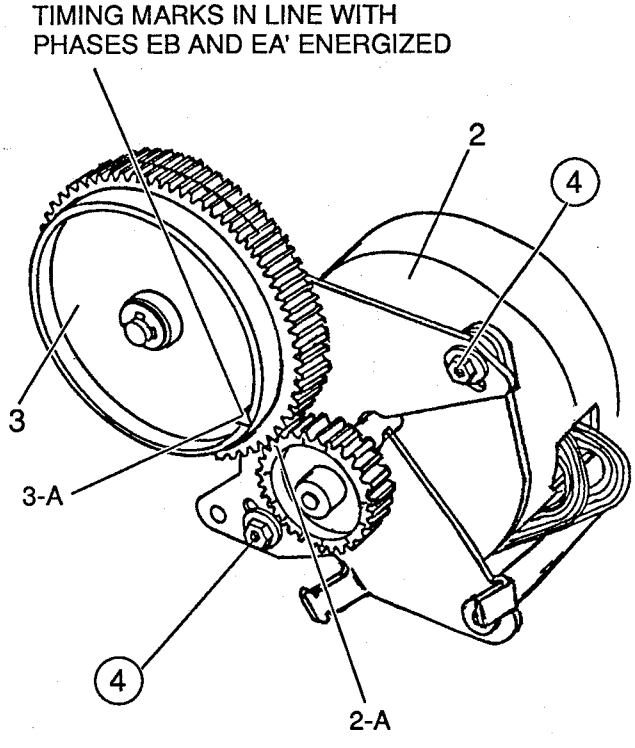
With Phases EB and EA' energized, Element Motor should hold the Home Character (e) Element Petal (1) at 12 o'clock position.

To Check: Hold down the "E" Keybutton, unhook the Lid Switch Actuator Spring, and turn power on to energize the Element Motor for one minute. Home Character Element Petal should be at 12 o'clock position, and parallel with Hammer. Turn power off and repeat this procedure if more time is required.



Adjustment:

1. With power off, loosen two Screws (4).
2. Energize Element Motor Phases EB and EA' (refer to "To Check" above).
3. Rotate Element Motor (2) so that Home Character (e) Element Petal is at 12 o'clock position. Motor Timing Mark (2-A) may align with Timing Mark (3-A).
4. Hold Motor in position and tighten upper Screw (4). Then tighten lower Screw (4). Check position of Element Petal and fine adjust if necessary. Turn power off.



2. Hammer Center Position

Requirement:

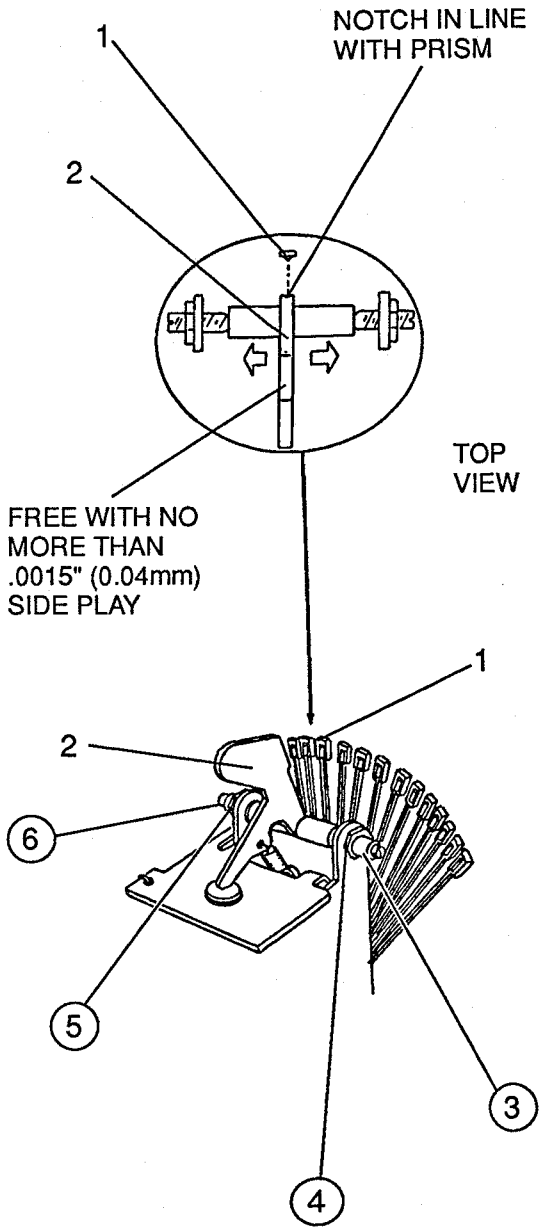
A) With Element Motor Phases EB & EA' energized, notch of Hammer (2) should align with Prism of Element Petal (1).

To Check: Energize Element Motor Phases EB and EA' (refer to Adjustment #1 "To Check"). Manually press Hammer (2) against Element Petal (1). Petal should not move left or right when Notch of Hammer engages Prism of Petal.

B) Hammer (2) should be free on its pivots with no more than .0015" side play.

Adjustment:

1. Energize Element Motor Phases EB and EA' (refer to Adjustment #1 "To Check").
2. Remove Ribbon Guide from Hammer Pivot Nuts.
3. Loosen Nuts (4) & (5) and regulate Right Pivot Screw (3) to meet Requirement A; tighten Right Nut (4).
4. Hold Hammer against Right Pivot Screw (3), and regulate Left Pivot Screw (6) to meet Requirement B; tighten Left Nut (5).
5. Replace Ribbon Guide onto Hammer Pivot Nuts.



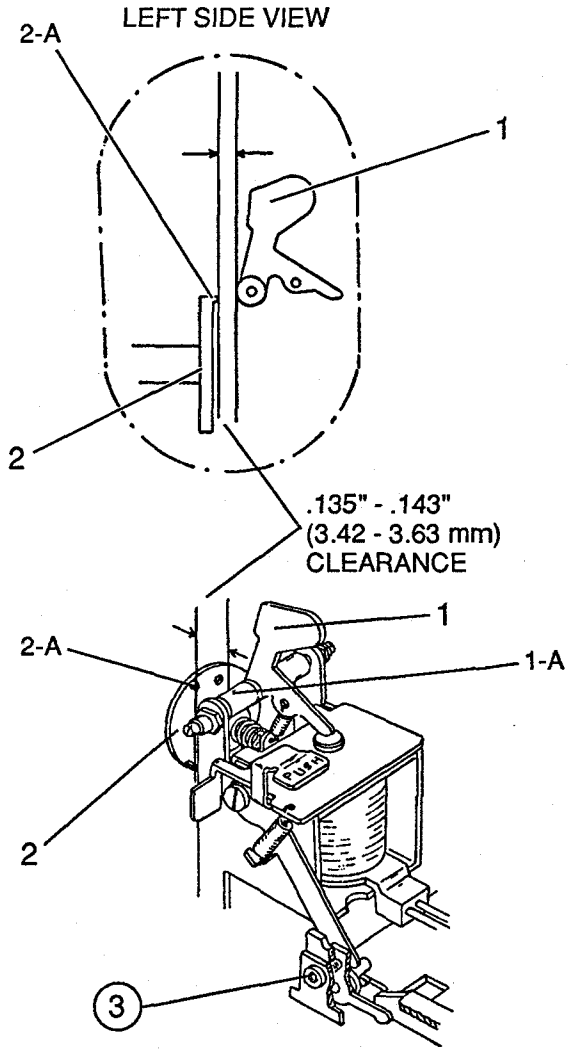
3. Hammer Assembly Position

Requirement:

With Hammer Assembly (1) latched in print position, there should be .135"-.143" clearance between Rear of Hammer Shaft (1-A) and Element Driver Pads (2-A). Check with Print Element and Ribbon Guide removed.

Adjustment:

1. Loosen Retractor Bracket Screw (3).
2. Rotate Element Driver (2) so that one pad is opposite Hammer Shaft.
3. With Hammer Assembly (1) latched in print position, insert a .139" Shim between Hammer Shaft (1-A) and Driver Pad (2-A).
4. Hold Hammer Assembly (1) against Shim, and tighten Screw (3).
5. Replace Ribbon Guide and Print Element.



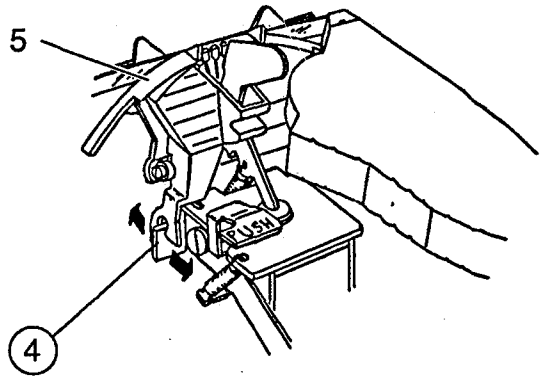
4. Ribbon Guide Position

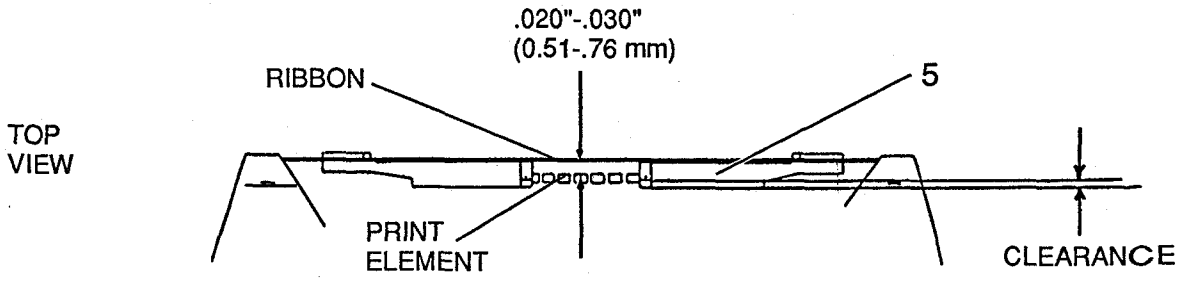
Requirement:

With a Ribbon Cassette in place, there should be .020"-.030" clearance between the Ribbon and the typeface of the Print Element. *Note:* This should provide clearance between the Print Element and the inside surface of the Ribbon Guide (5).

Adjustment:

Form Hammer Solenoid Ear (4) forward or rearward to position Ribbon Guide.

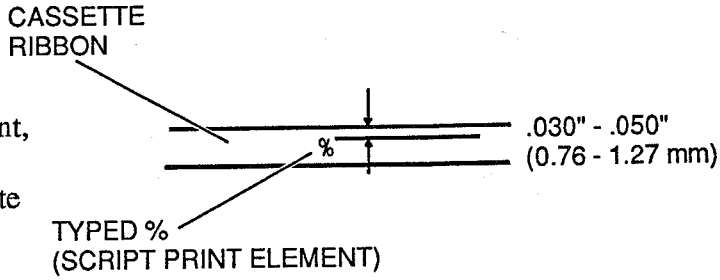




5. Ribbon Cassette Position

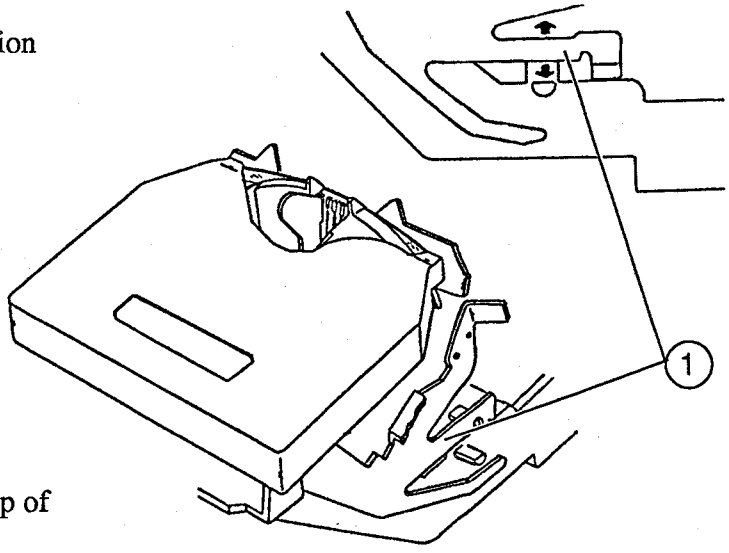
Requirement:

When typed with a Script Print Element, the top of the "%" character should be .030"-.050" from the top of the Cassette Ribbon.



Adjustment:

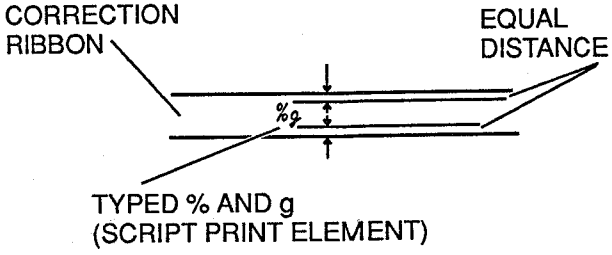
Form Downstop Arm (1) on Correction Lift Bail up or down.



6. Correction Cassette Lift

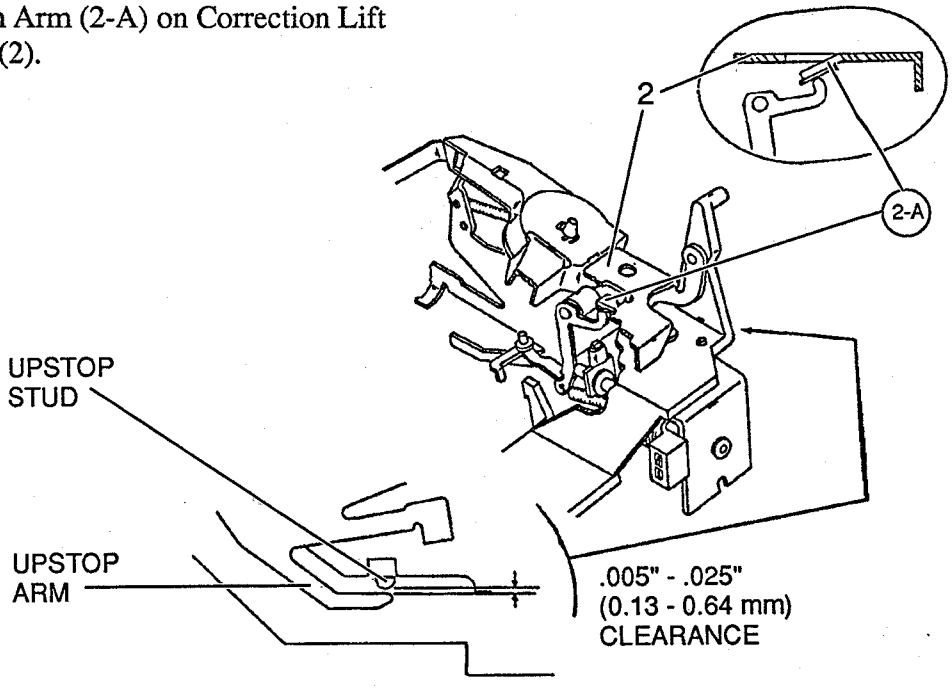
Requirement:

When correcting with a Script Print Element, the distance between the top of the "%" character and the top of the correction ribbon should equal the distance between the bottom of a lower case "g" and the bottom of the correction ribbon. There should be .005"-.025" clearance between the Upstop Arm and Stud during a correction cycle.



Adjustment:

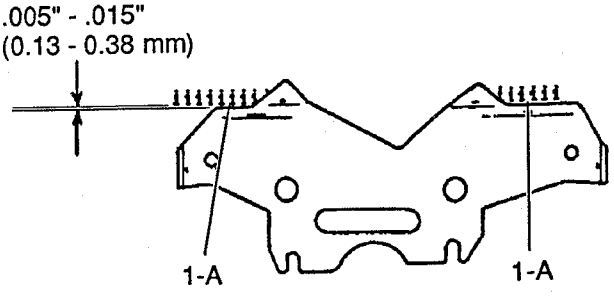
Form Arm (2-A) on Correction Lift Bail (2).



7. Line Indicator Position

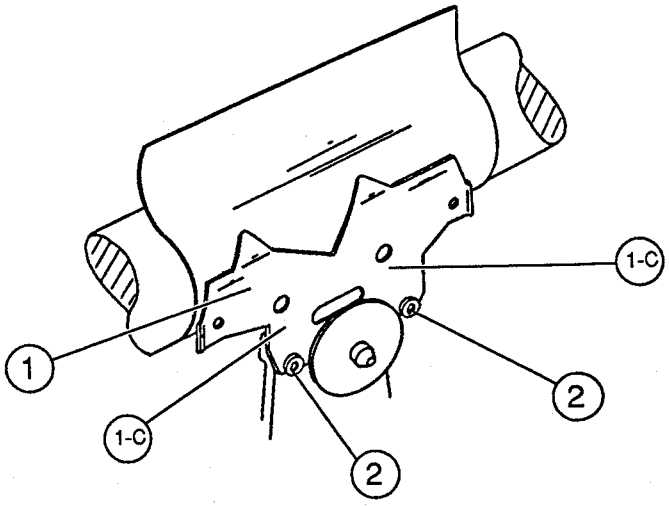
Requirement:

Line Indicator Surfaces (1-A) should rest .005"-.015" below a row of printed "i's," and should be parallel with the typed characters.



Adjustment:

Position Line Indicator (1) with attaching Screws (2).



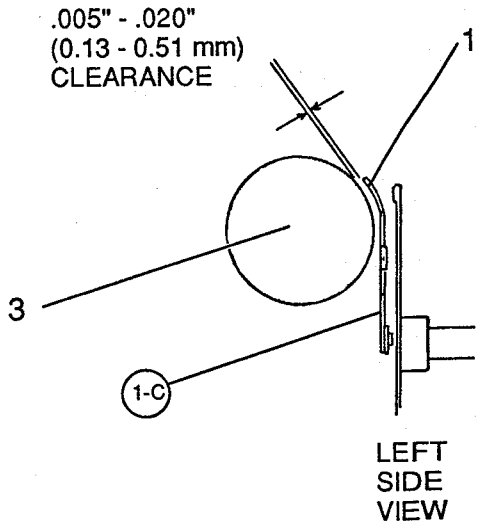
8. Line Indicator Clearance from Platen

Requirement:

There should be .005"-.020" clearance between Line Indicator (1) and Platen (3).

Adjustment:

Form Left and Right Line Indicator Surfaces (1-C) forward or rearward.



SECTION 6

TROUBLESHOOTING

INDEX

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Troubleshooting Guide	6-5 to 6-9
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INITIALIZATION SEQUENCE

The sequence of events which occur during initialization is described below. Understanding this process enables the technician to compare what **does** happen with what **should** happen, which can often lead to quick diagnosis of a problem.

1. When the Power Switch is turned on, the Ribbon Solenoid quickly energizes to insure the Ribbon mechanism is in its proper starting position. The Carrier moves .400" to the right to assure that the Left End Switch Positioner is not holding the Left End Switch closed, and then moves .100" to the left.

2. The Carrier Motor Shaft is stabilized by the Electronics applying holding current to the Carrier Motor phases.

3. The Index Motor Shaft is rotated for 1/2 forward linespace and then 1/2 reverse linespace to make sure the Drive Gears, Pinion, and Platen Gear are seated properly.

4. Quick rotation of the Element Motor Shaft takes place to snap the Element onto the Drive Disc (a maximum of 2 1/2 revolutions).

   LCD Models: Note: If a Right Ribbon Cassette is not placed in the Carrier or the wrong Ribbon Cassette is placed in the Carrier or the Lid Switch is closed (Lid open), steps 1 through 4 are performed, but the Carrier only moves right approximately 1 1/4" and stops. The LCD displays "LID?-RIBBONS?." If the proper Ribbon Cassette is installed in the Carrier and the Lid is closed, the machine continues its normal initialization sequence.

5. The Electronics checks if the Left End Switch is open. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

6. The Carrier moves left for a maximum of four seconds to check the closing of the Left End Switch. If the Left End Switch never closes, the Initialization Sequence repeats itself every four seconds until the switch is closed or power is turned off. Note: On Non-LCD models, the electronics checks that the Right Ribbon Switch is open: if open, initialization continues; if closed, the Carrier moves to Space 8 or 9 and stops; and then the Shift LED flashes. Once the Right Ribbon Switch reopens, the machine continues its normal initialization sequence.

7. The Carrier moves 1.00" to the right and Electronics checks if the Switch opens. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

8. The Carrier moves to the left until the Left End Switch closes, and then another .100" to the left.

9. The Electronics energizes the Element Motor counterclockwise for up to 1.2 revolutions. When the ear on the Left End Switch Positioner drops into the notch on the Rear Scissors Gear under Spring Tension, the Left End Switch opens. The Electronics stops shaft rotation and checks that the Left End Switch opened on the Element home phases. If the Left End Switch does not open, the Electronics holds the Carrier stable until the switch opens. If the Switch does not open when the proper Element Motor phases are turned on, the initialization sequence repeats until this does occur, or until power is turned off.

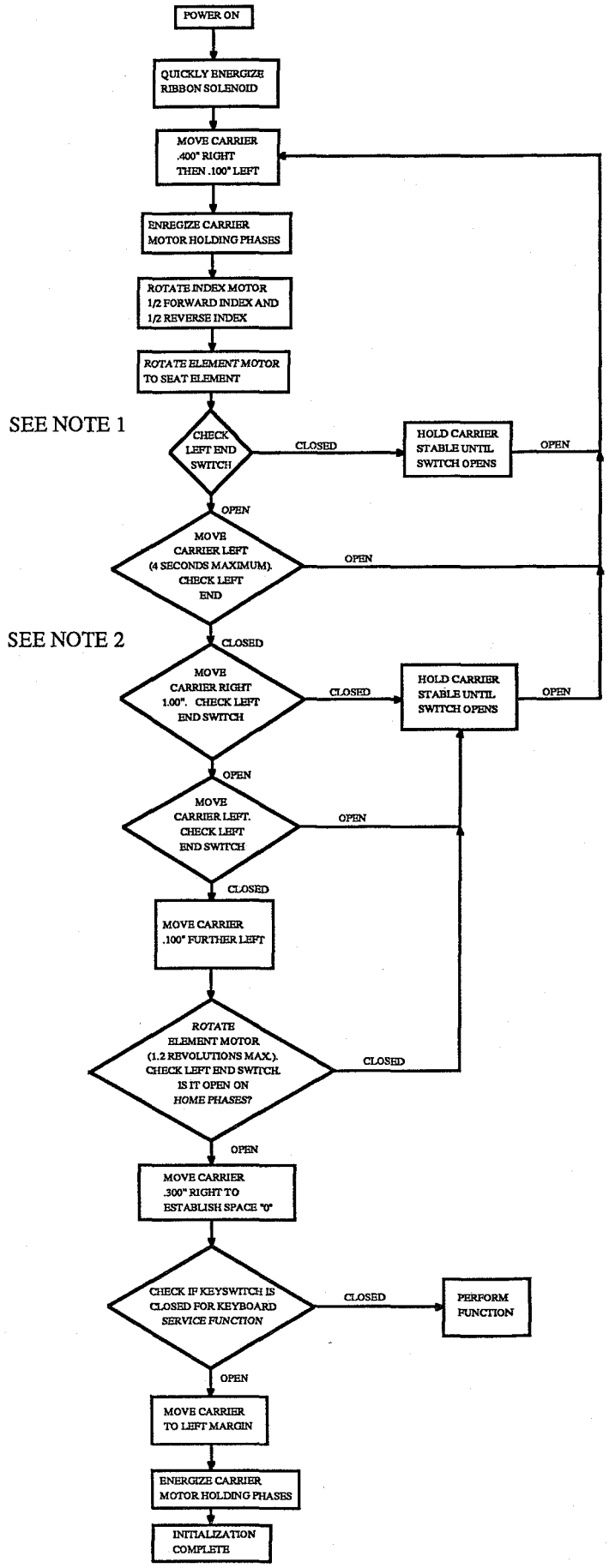
10. Carrier moves approximately .300" to the right. This new location is reference position Zero.

11. The Electronics checks to see if a Keyswitch for a Keyboard Service Function is closed. If so, the Electronics performs the function.

12. If Keyboard Service Function Keyswitches are open, the Carrier moves to the Preset Left Margin, and the Electronics applies holding current to the Carrier Motor Phases.

    The Left End Switch is also used as a Lid Switch. Whenever the Deck is raised, the Lid Switch Actuator closes the Left End Switch through Spring tension. On Non-LCD Models, the Shift Lock LED flashes. On LCD Models, the Carrier moves to position 84 and the LCD displays "LID?-RIBBONS?." When the Deck is closed, the Switch opens, and the Carrier reinitializes and relocates to its previous position ready for typing.

INITIALIZATION SEQUENCE FLOW CHART


POWER ON
QUICKLY ENERGIZE RIBBON SOLENOID
MOVE CARRIER .400" RIGHT THEN .100" LEFT
ENREGIZE CARRIER MOTOR HOLDING PHASES
ROTATE INDEX MOTOR 1/2 FORWARD INDEX AND 1/2 REVERSE INDEX
ROTATE ELEMENT MOTOR TO SEAT ELEMENT
SEE NOTE 1
CHECK LEFT END SWITCH
CLOSED
HOLD CARRIER STABLE UNTIL SWITCH OPENS
OPEN
OPEN
MOVE CARRIER LEFT (4 SECONDS MAXIMUM). CHECK LEFT END
OPEN
SEE NOTE 2
CLOSED
MOVE CARRIER RIGHT 1.00". CHECK LEFT END SWITCH
CLOSED
HOLD CARRIER STABLE UNTIL SWITCH OPENS
OPEN
OPEN
MOVE CARRIER LEFT. CHECK LEFT END SWITCH
OPEN
CLOSED
MOVE CARRIER .100" FURTHER LEFT
ROTATE ELEMENT MOTOR (1.2 REVOLUTIONS MAX.). CHECK LEFT END SWITCH. IS IT OPEN ON HOME PHASES?
CLOSED
OPEN
MOVE CARRIER .300" RIGHT TO ESTABLISH SPACE "0"
CHECK IF KEYSWITCH IS CLOSED FOR KEYBOARD SERVICE FUNCTION
CLOSED
PERFORM FUNCTION
OPEN
MOVE CARRIER TO LEFT MARGIN
ENERGIZE CARRIER MOTOR HOLDING PHASES
INITIALIZATION COMPLETE

NOTES:

1) CHECK THAT RIGHT RIBBON SWITCH IS OPEN ON LCD MODELS.

2) CHECK THAT RIGHT RIBBON SWITCH IS OPEN ON NON-LCD MODELS.

TROUBLESHOOTING GUIDE

This Troubleshooting Guide provides probable cause for some specific machine problems. Since electrical problems may cause a machine failure during initialization, the technician should read and thoroughly understand the preceding section on the Initialization Sequence.

OBSERVE STATIC PRECAUTIONS

IMPORTANT: When working with static sensitive devices, such as the Liquid Crystal Display (LCD) and Printed Circuit Boards, be sure to observe static precautions to prevent damage to these devices.

GENERAL TROUBLESHOOTING TECHNIQUES

- Look for the obvious (broken wires, unplugged connectors, etc.)
- Check the problem part first, and then logically limit the possibilities through all associated wiring, connectors, and circuit boards.
- Check mechanical functions for freeness, lubrication, and proper operation.
- Check standard adjustments.

Diagram Reference Symbol

7B-1 Indicates appropriate diagram page number.

Watchdog Circuit

The Watchdog Circuit is a safety circuit that monitors the length of time that the Ribbon Solenoid, Hammer Solenoid, Element Motor, Carrier Motor, and Linefeed Enable (LCD Models only) are energized. If any of the above components on the Non-LCD Models remain energized longer than normal, the Watchdog Circuit shuts down the +18 VDC power supply, which in turn shuts down the +5 VDC power supply. On the LCD Models, if any component remains energized longer than normal, the Watchdog Circuit resets the Slave, Master, and RAM IC's.

Non-LCD Models: When checking the power supplies (+18VDC & +5VDC) of the machine, the voltage levels should be steady. If they vary up and down, disable the Watchdog Circuit by connecting ground to Point A on the schematic. Recheck the voltages. If voltages are okay, a defect exists in the machine or Watchdog Circuit.

LCD Models: If the machine continues to reinitialize, disable the Watchdog Circuit by connecting ground to Point A on the schematic. Reinitialize the machine. If machine initializes and reacts normally, a defect exists in a motor, solenoid, or Watchdog Circuit.

Liquid Crystal Display: On machines with a Liquid Crystal Display (LCD), a defective LCD may create a problem which appears to be a Control PC Board problem. Disconnect the LCD from the Control PC Board and initialize the machine. Under normal conditions, the LCD can be unplugged from the Control PC Board without affecting the machine's initialization and typing functions. If the machine initializes and functions properly, check machine with a known good LCD. If machine still malfunctions, change Control PC Board.

SYMPTOM: Machine Totally Dead

Probable Causes:
1) Transformer
2) Control PC Board

How to Check Power Circuit

A) Disconnect Power Cord from AC outlet. Disconnect Transformer Connector P-TRA from Control PC Board. Plug Power Cord into AC outlet.

Use a Voltmeter to measure the AC voltage across the two pins of Transformer Connector P-TRA. The reading should be 25-35 Volts AC. If not, replace Transformer.

B) If the reading is good, disconnect Power cord, and reconnect Transformer Connector P-TRA to the Control PC Board. Plug in Power Cord, and measure the AC Voltage across Connector P-TRA. The reading should be approximately 24 Volts AC. If not, there's a short on the Control PC Board.

C) If the reading is good, check the On-Off Switch contacts on the PC Board. On Non-LCD Models, the contacts close to turn on the machine; however, on LCD Models, the contacts are open when the machine is on. If the contacts check okay, the electronics on the Control PC Board are faulty--troubleshoot and repair the Board.

SYMPTOM: Machine Fails to Initialize or Repeats Initialization

Note: When checking initialization, move Carrier to the center of the machine, and turn machine on.

Probable Causes:
1) Control PC Board
2) Ribbon Solenoid
3) Hammer Solenoid
4) Element Motor
5) Carrier Motor
6) Left End/Lid Switch

How To Analyze Initialization Problems:

A) Make a general inspection of mechanical components of machine. Check for bent or broken parts. Move Carrier back and forth, and rotate Element Motor Shaft to check for binds.

B) If machine still does not initialize properly, analyze what happens when the machine is turned on. Compare what does happen with what should happen as described in the Initialization Sequence on pages 6-2 and 6-3.

C) **Service Hints:** Failure of certain component parts may result in the following symptoms: ***7B-1 8B-1***

LCD and Non-LCD Models

Symptom	Probable Cause
Machine Initializes properly but keeps repeating initialization	1) Watchdog Circuit on Control PC Board is defective
Carrier Motor vibrates noisily, and continuously tries to initialize	1) Carrier Motor Phase or Phase connection is open or shorted 2) Control PC Board--motor circuit bad
Element Motor vibrates noisily, and continuously tries to initialize	1) Element Motor Phase or Phase connection is open or shorted 2) Control PC Board--motor circuit bad
Carrier vibrates against Left Side Frame then tries to reinitialize	1) Left End Switch or switch connection is always open 2) Control PC Board--Switch circuit bad
Element spins and Carrier moves approximately $1^1/_4$" to the right. LCD Models indicate "LIDS?-RIBBONS?." On Non-LCD Models, the Shift LED flashes.	1) Left End Switch is always closed 2) Control PC Board--Switch circuit bad
Carrier or Element doesn't move at all	1) Motor connectors not connected to Control PC Board 2) Control PC Board--Loss of 18 VDC to Motors

Non-LCD Models only

Carrier moves right three spaces and spins Print Element. Shift LED flashes at the beginning of Carrier movement. This sequence is repeated until Carrier contacts Right Frame.	1) Ribbon Solenoid is open or Ribbon Solenoid wiring to Control PC Board is defective. 2) Control PC Board--Solenoid circuit bad
No Carrier movement Left or Right, but Print Element wiggles about 1-2 petals every second. Shift LED flashes every second.	1) Hammer Solenoid is open or Hammer Solenoid wiring to Control PC Board is defective. 2) Control PC Board--Solenoid circuit bad

SYMPTOM: Machine Completes Initialization, but Shift LED Flashes or LCD shows "LIDS?-RIBBONS?"

Probable Causes:
1) Lid Switch Mechanism
2) Control PC Board
3) Right Ribbon System or mismatch of Ribbon Cassettes

To Check:

A) Check that Left End/Lid Switch contacts are open when the Lid is closed. If not, check for mechanical binds in mechanism. If mechanism operates properly, replace Left End/Lid Switch. If switch does not resolve problem, check wiring first; then replace Control PC Board. ***7E-1 8E-1***

B) Check that Right Ribbon System Switch is open when the proper Ribbon Cassette is installed on the Carrier. If not, check for mechanical binds in mechanism. If mechanism operates properly, replace Right Ribbon System Switch contacts. If switch does not resolve problem, check wiring first; then replace Control PC Board. ***7E-1 8E-1***

SYMPTOM: Index Motor Vibrates Noisily and Fails to Linespace

Probable Causes:
1) Index Motor--phase open or shorted
2) Control PC Board--Index motor circuit defective

To Check:

Check Index Motor for open or shorted phase windings (refer to Resistance Checks in this Section). If Index Motor is defective, replace it. If not, replace Control PC Board. ***7B-1 8B-1***

SYMPTOM: Prints Wrong Characters or Strobes (Hammer Strikes Between Print Element Petals)

Probable Causes:
1) Defective Left End Switch.
2) Incorrect Element Motor Position (Adj. #1).
3) Incorrect Hammer Center Position (Adj. #2).
4) Broken Disc on Element Drive Shaft or binding Element Drive Shaft.
5) Linefinder or Ribbon Guide interferes with Print Element.
6) Improper Element Scissors Gear tension.
7) Inside Scissors Gear slips on Element Drive Shaft.
8) Defective Element Motor.
9) Defective Control PC Board.

SYMPTOM: Hammer Solenoid Fails to Fire

Probable Causes: 1) Hammer Solenoid
2) Control PC Board

How to Check for Solenoid Problems:

Check Solenoid for mechanical binds. Measure resistance of Solenoid and replace it if it is defective (refer to Resistance Checks in this Section). If resistance is good, replace Control PC Board. ***7B-1 8B-1*** Note: If the Hammer Solenoid fails to fire, mechanically the Ribbon Cassette fails to advance.

SYMPTOM: Beeper Fails to Beep

Probable Cause: Defective Beeper or Beeper Circuit on Control PC Board

To Check:

Try an action that requires the Beeper to function. If it does not beep, replace Beeper or Control PC Board.

SYMPTOM: Ribbon Cassette Feeds, but Correction Cassette does not Lift and Feed

Probable Causes: 1) Ribbon Solenoid
2) Control PC Board

To Check:

Check Ribbon Solenoid and Correction Bail for mechanical binds. Measure resistance of Solenoid and replace it if defective (refer to Resistance Checks in this Section). If resistance is good, replace Control PC Board. ***7B-1 8B-1***

SYMPTOM: Poor Vertical Correction Registration

Probable Causes: 1) Ribbon Guide/Linefinder resting on Platen
2) Paper Feed Rollers binding
3) Platen binding (problem usually occurs at left end)

To Check: Locate the source of the bind and free up the parts.

SYMPTOM: Left Margin Changes

Probable Cause: Mechanical interference with Carrier movement

To Check: Locate and remove cause of interference.

RESISTANCE AND VOLTAGE CHECKS

Use the following Resistance and Voltage Check Charts when troubleshooting problems with electrical components. With Volt/Ohmmeter probes on specified pins of the Connector, the resistance or voltage readings should read approximately at the values given in the charts. Note: Readings may vary between Volt/Ohmmeters. Refer to the Wiring Diagrams in the appropriate Diagrams Section and Pin locations.

Resistance Checks

All Resistance Checks must be made with the Power Off and the appropriate Connector unplugged from the Control PC Board. Refer to pages 7B-1 and 8B-1 to identify Connectors.

* When checking resistance of Motors, both common Connectors on each motor should be measured before assuming a phase is open. The correct resistance readings should occur on one or the other common, not both.

Component	*Connector*	*Pin Numbers*	*- Approximate Resistance - International Non-LCD Models*	*International LCD Models*
*Element Motor	P-ELE			
COM and A		3 **or** 4 & 1	16 Ω ± 7%	24 Ω ± 7%
COM and A'		3 **or** 4 & 2	16 Ω ± 7%	24 Ω ± 7%
A and A'		1 & 2	32 Ω ± 7%	48 Ω ± 7%
COM and B'		3 **or** 4 & 5	16 Ω ± 7%	24 Ω ± 7%
COM and B		3 **or** 4 & 6	16 Ω ± 7%	24 Ω ± 7%
B' and B		5 & 6	32 Ω ± 7%	48 Ω ± 7%
*Carrier Motor	P-CAR			
COM and A		3 **or** 4 & 1	36 Ω ± 7%	36 Ω ± 7%
COM and A'		3 **or** 4 & 2	36 Ω ± 7%	36 Ω ± 7%
A and A'		1 & 2	72 Ω ± 7%	72 Ω ± 7%
COM and B'		3 **or** 4 & 5	36 Ω ± 7%	36 Ω ± 7%
COM and B		3 **or** 4 & 6	36 Ω ± 7%	36 Ω ± 7%
B' and B		5 & 6	72 Ω ± 7%	72 Ω ± 7%
*Index Motor	P-IND			
COM and A		3 **or** 4 & 1	50 Ω ± 7%	50 Ω ± 7%
COM and A'		3 **or** 4 & 2	50 Ω ± 7%	50 Ω ± 7%
A and A'		1 & 2	100 Ω ± 7%	100 Ω ± 7%
COM and B'		3 **or** 4 & 5	50 Ω ± 7%	50 Ω ± 7%
COM and B		3 **or** 4 & 6	50 Ω ± 7%	50 Ω ± 7%
B' and B		5 & 6	100 Ω ± 7%	100 Ω ± 7%
Left End Switch	P-LES	1 & 2	0 Ohms when closed; Infinite (∞) ohms when open	
Ribbon Solenoid	P-RSOL	1 & 2	9.60 Ω ± 1	
Hammer Solenoid	P-HSOL	1 & 2	1.98 Ω ± .2	
Transformer	AC Plug	Prongs	Approximately 17 Ω	
	P-TRA	1 & 2	Approximately 1 Ω	
Right Ribbon Switch	P-RRS	1 & 2	0 Ohms when closed Infinite (∞) Ohm when open	

DC Voltage Checks

All DC Voltage checks must be made with Connectors in place and Power On. Set Voltmeter for DC Volts and appropriate voltage range. With Power Off, touch common probe of Voltmeter to Logic Ground, and touch the other probe to the Check Point listed in the Chart. Turn Power On, allow machine to initialize, and take readings (Idle State). Refer to the appropriate Diagrams Section for Connector locations. ***7B-1 7D-1 8B-1 8D-1***

Caution: Whenever performing checks with Power On, take care not to short two points together with the Voltmeter probes.

	-Check Point-		*-Location-*		
Component	*Non-LCD Models*	*LCD Models*	*Non-LCD Models*	*LCD Models*	*Approximate DC Voltage*
Control PC Board:					
+36 VDC	R1	S1	Left Side	Rivet Area	+36 VDC
+18 VDC	W1	R63	Left Side	Left Side	+18 VDC
+5 VDC	R6	R61	Left Side	Left Side	+5 VDC
Left End Switch Closed:	P-LES	P-LES	Pin 1 Pin 2	Pin 1 Pin 2	<.12 VDC <.12 VDC
Left End Switch Open:	P-LES	P-LES	Pin 1 Pin 2	Pin 1 Pin 2	<.12 VDC +4.8 VDC
Ribbon Solenoid	P-RSOL	P-RSOL	Pins 1-2	Pins 1-2	+18 VDC
Hammer Solenoid	P-HSOL	P-HSOL	Pins 1-2	Pins 1-2	+18 VDC
Element Motor	P-ELE	P-ELE	Pins 1-6	Pins 1-6	+18 VDC
Carrier Motor	P-CAR	P-CAR	Pins 1-6	Pins 1-6	+.7 or >1.9 VDC

Note: Voltage reading depends upon location of the Carrier Rotor during holding current.

Index Motor	P-IND	P-IND	Pins 1-6		+18 VDC
Memory Back-up Battery		BAT 1		Positive Terminal (use Negative Terminal for Ground)	+2.3 VDC Nominal, but not less than 2 VDC

Transformer AC Voltage Checks

Make Transformer AC Voltage checks with Connectors in place and Line Cord plugged into AC outlet. Set Voltmeter for AC Volts and appropriate voltage range. Touch one probe to one point listed below, and the other probe to the other point. ***7B-1 8B-1***

Check	*Check Points*	*Approximate Voltage*
Transformer Input	Check Line Voltage at Power Outlet	Line Voltage- 117 VAC **or** 220 VAC **or** 240 VAC
Transformer Output	P-TRA Pins 1 & 2	24 VAC minimum

KEYBOARD TROUBLESHOOTING PROCEDURE

Note: Refer to the appropriate Diagrams Section for Keyboard Switch Layout and Matrix Charts. *7A-2 7A-3 8A-2 8A-3*

1. Identify the Matrix Position Number(s) for the Key(s) from the Keyboard Switch Layout Chart (the character "1" is matrix position S2).

2. Identify the Column and Row for that position from the Keyboard Matrix Chart. Then determine Keyboard Connector Pin numbers that correspond with the column and row of the suspect key (i.e. position S2 is tied to Column C1 and Row R0, which correspond to pins 7 & 14 of the Keyboard Connector).

3. Determine whether the problem is with the Keyboard or Control PC Board as follows:

   A) Remove the Keyboard from the machine under test. Power up the machine to initialize it and actuate the Lid Switch.

   To check operation of any individual character, simply short the appropriate pins on the Control PC Board Connector J1 (or J2 on LCD Models) to see if that particular character types. For example, if checking the character "1," touch a Jumper Wire between pins 7 & 14 of Connector J1 (or J2 on LCD Models). This allows the typewriter to type the character "1" and repeat it until the Jumper Wire is removed. If the character fails to type, the problem is in the Control PC Board and replacement is necessary.

   B) If character does type, then problem is a Keyboard fault.

4. Diagnose a Keyboard fault as follows:

   A) Touch the one lead of an ohmmeter to the pin on the Keyboard Connector that corresponds with the appropriate Column. Then touch the other lead to the pin on the Keyboard Connector that corresponds with the appropriate Row [i.e. for position S2 touch one lead to Connector P1 (or P2 on LCD Models), Pin 7, (Column C1) and the other lead to Connector P1 (or P2 on LCD Models), Pin 14 (Row R0)]. Note: Since there are no Diodes used with this Keyboard, it makes no difference which ohmmeter lead is touched to the Matrix Column and which one is touched to the Matrix Row.

   B) Depress the Key being checked. If the switch is good, the ohmmeter should indicate less than 1000 ohms resistance. (Readings vary with different meters. To know what the meter should read, take a similar reading on a known good Key Switch in the Keyboard circuit). If meter indicates an open, replace the Molded Dome Switches.

   C) If there are a definite 7 or 8 characters or functions that do not operate, check to see if those 7 or 8 characters or functions are in the same Column or Row in the Keyboard Matrix. If they are, check all switches in that Column or Row through the Keyboard Connector. If they are bad, replace the Keyboard Flexible Circuit.

KEYBOARD SERVICE FUNCTIONS AT POWER UP

Some Keybuttons perform service functions if they are depressed and held down during initialization. To activate any of these functions, with the Jackets in place and deck closed (if Jackets are off machine, disable Lid Switch) depress the desired keybutton and hold it down until initialization is complete. Release the Keybutton after the Service Function begins.

If the Keyboard is disconnected from the machine, Service Functions can be entered by shorting the appropriate Keyswitch Row and Column pins on Keyboard Connector J1 (J2 on LCD Models). Remove the jumper after the Service Function begins. Refer to the appropriate Keyboard Layout Chart and Matrix Diagram to determine which Row and Column should be shorted to perform the Service Function. *7A-2 7A-3 8A-2 8A-3*

Keybutton	Function
	LCD and Non-LCD Models
Return	Initiates Self Typing. The machine prints out a line of characters, corrects some of them, and then performs a linespace and carriage return. The machine continues this self typing until power is turned off.
"E"	On Non-LCD Models, the Carrier moves to Space 0, and energizes Element Motor phases EB and EA' for one minute to make adjustments (Shift LED flashes at same time). After one minute, the machine beeps, the Carrier moves to Space 12, and the electronics returns to normal typing mode. On LCD Models, the Carrier moves to preset left margin, machine beeps three times, shows "ALIGNMENT TEST" in the LCD, energizes Element phase EB and EA' for one minute, beeps three times, shows "TEST COMPLETE" in the LCD, and returns to either Typewriter or Memory mode. Either machine must be turned off and then on again to energize for additional one minute intervals.
"S"	Prints out the part number of the Master (Non-LCD Models) or displays Master and Slave (LCD Models) of the Microcontrollers installed on the Control PC Board. Also, prints out the language that the software is designed for. On Non-LCD Models, the Carrier moves to the left margin for typing. On LCD Models, the machine must be turned off to cancel this function.
	LCD Models Only
"T"	Clears out all memory files and resets processors. "Sure? Y/N" shows in the LCD. If "Yes" is selected, the memory is cleared, and then Carrier goes to preset left margin and machine returns to either Typewriter or Memory Mode depending on main switch location. If "No" is selected, the Carrier moves to preset left margin and machine returns to either Typewriter or Memory mode.
"V"	Performs RAM check, clears all memory files, and resets processors. Carrier moves to Space 0 and "RAM Check" shows in the LCD. If the RAM is okay, "RAM Size = (size of RAM)" shows in the LCD. The machine must be reinitialized for Keyboard entry. When the machine reinitializes, it beeps three times, and "Memory Lost" shows momentarily in the LCD. This test resets margins to factory presets.

SECTION 7

DIAGRAMS VW2140

INDEX

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	Keyboard Matrix Diagram	7A-3
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	Frames	7C-1
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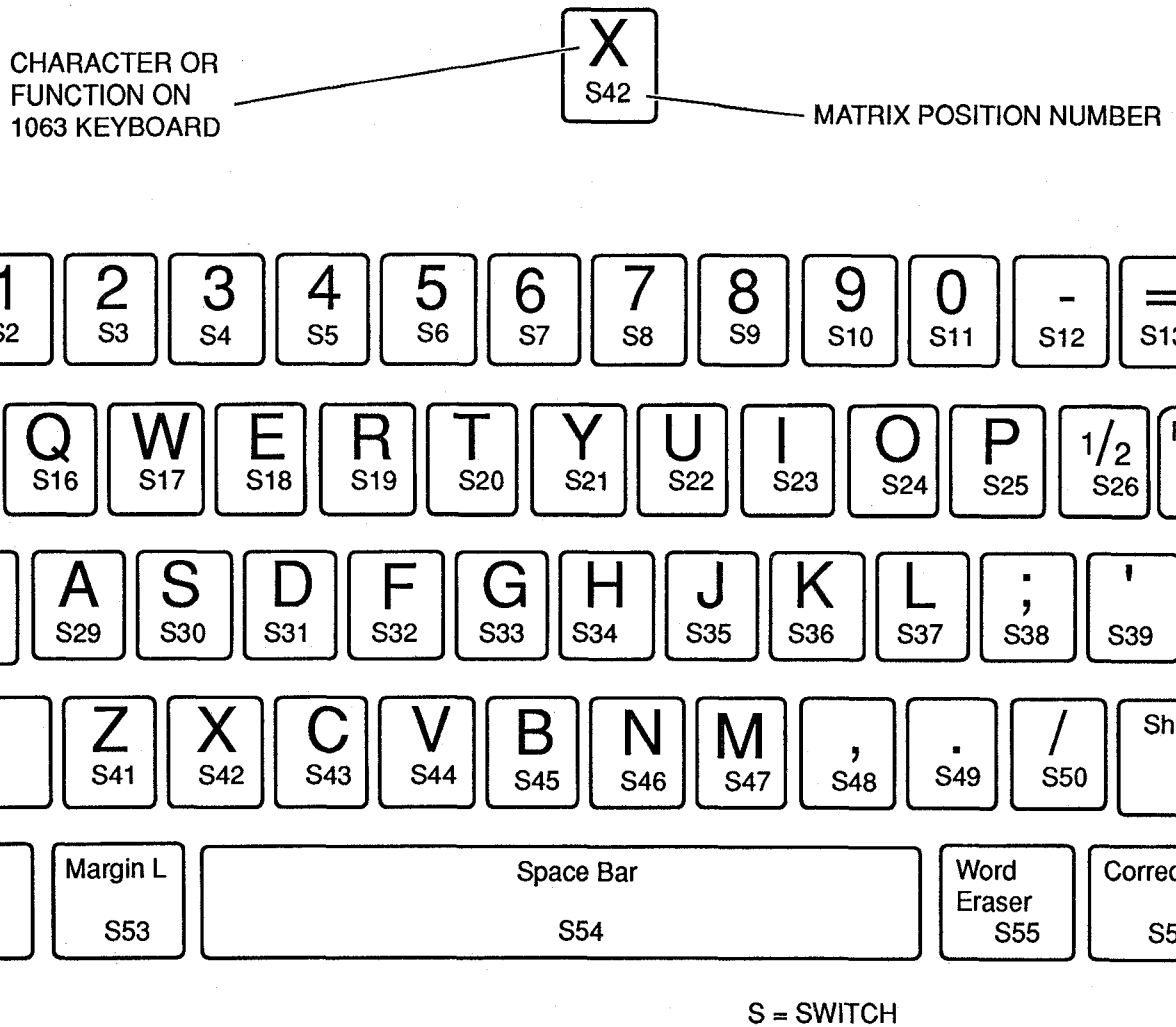
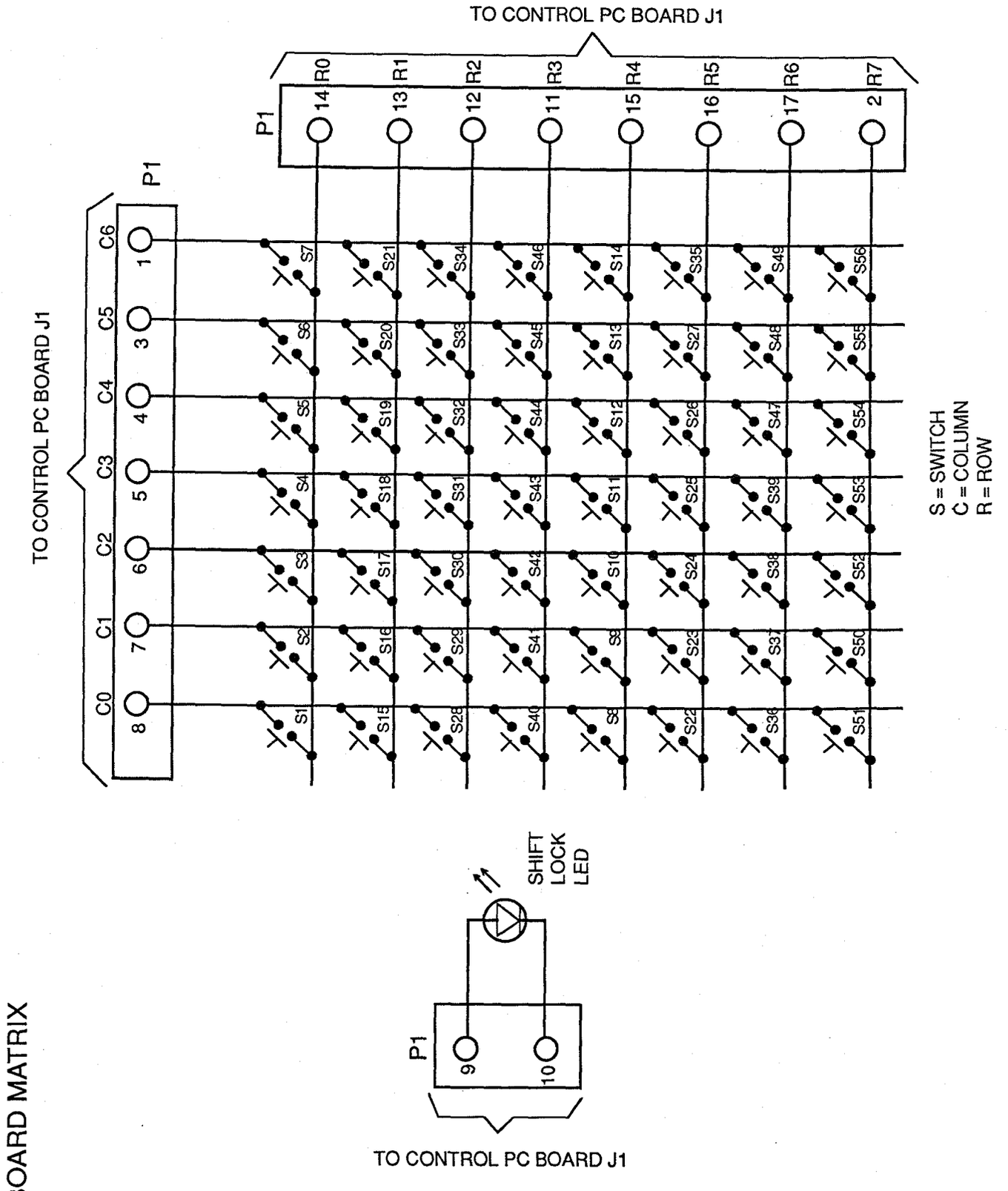
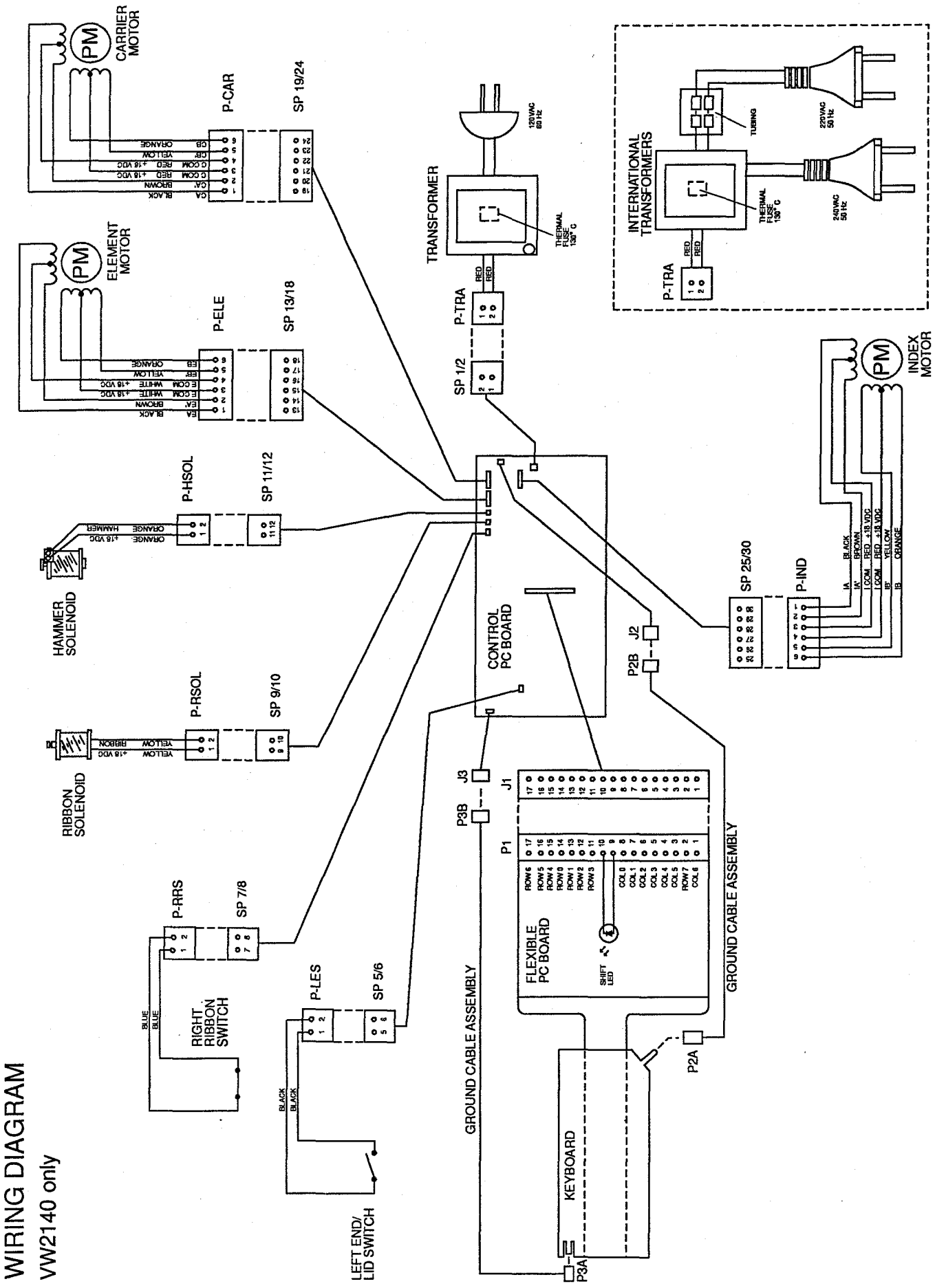
7F	SCHEMATIC	7F-1

KEYBOARD LAYOUT CHART





KEYBOARD MATRIX

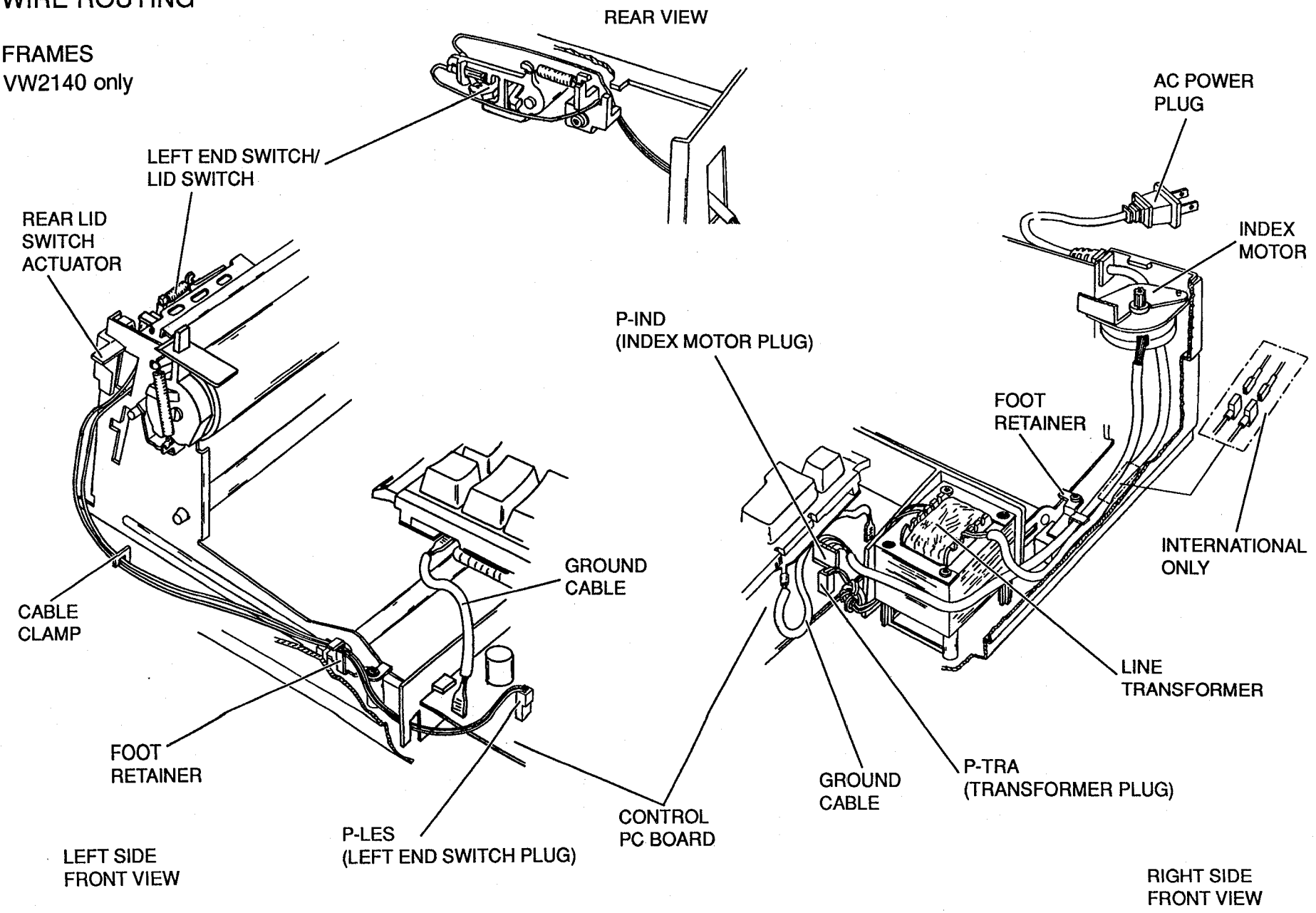


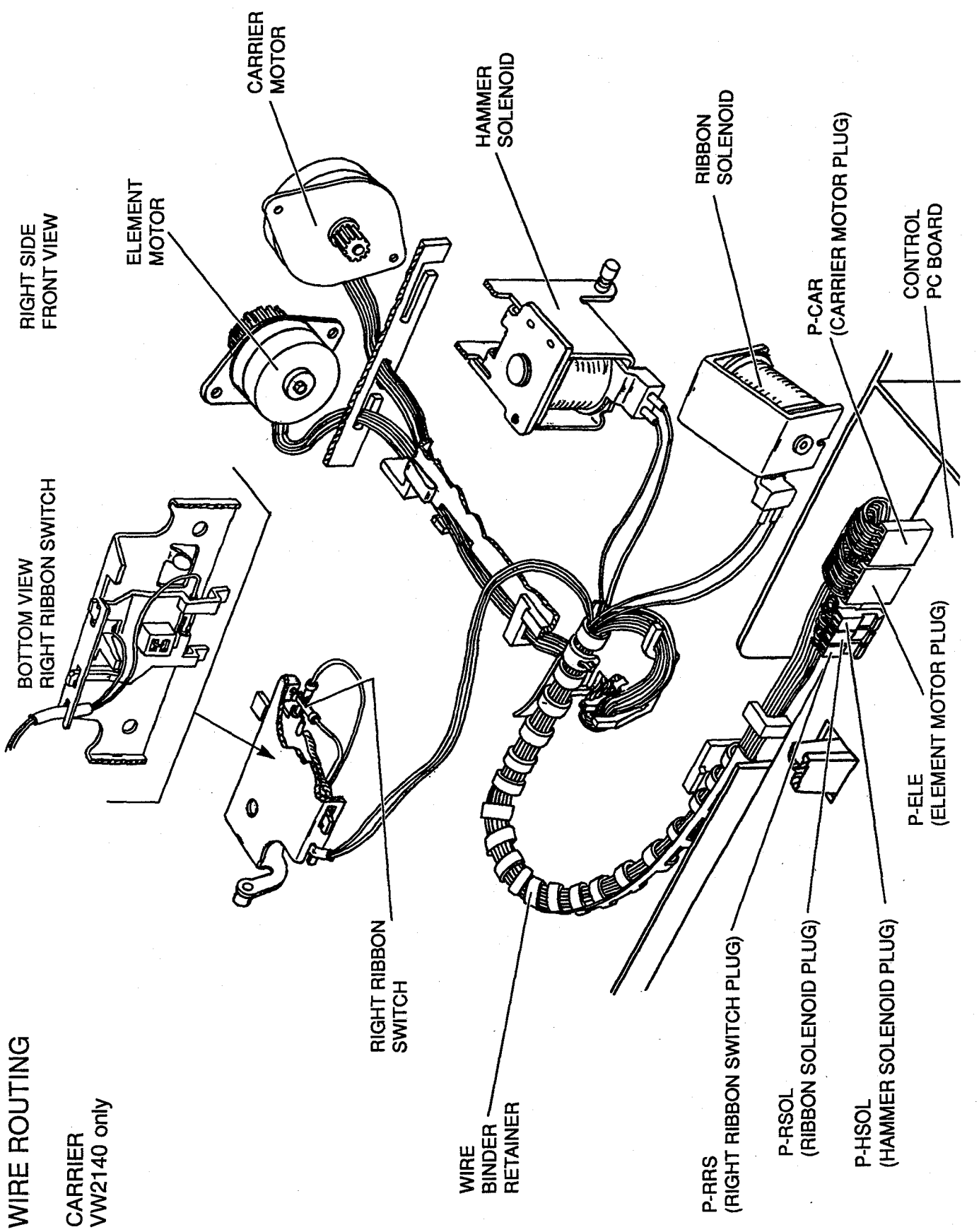
WIRING DIAGRAM

VW2140 only

WIRE ROUTING

FRAMES
VW2140 only



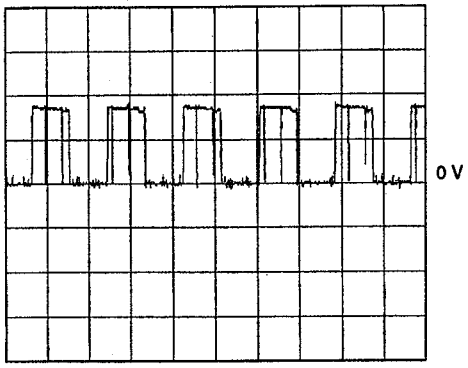

WIRE ROUTING
CARRIER
VW2140 only
BOTTOM VIEW
RIGHT RIBBON SWITCH
RIGHT SIDE
FRONT VIEW
ELEMENT
MOTOR
CARRIER
MOTOR
HAMMER
SOLENOID
RIBBON
SOLENOID
P-CAR
(CARRIER MOTOR PLUG)
CONTROL
PC BOARD
RIGHT RIBBON
SWITCH
WIRE
BINDER
RETAINER
P-RRS
(RIGHT RIBBON SWITCH PLUG)
P-RSOL
(RIBBON SOLENOID PLUG)
P-HSOL
(HAMMER SOLENOID PLUG)
P-ELE
(ELEMENT MOTOR PLUG)

WAVE FORMS

VW2140 only

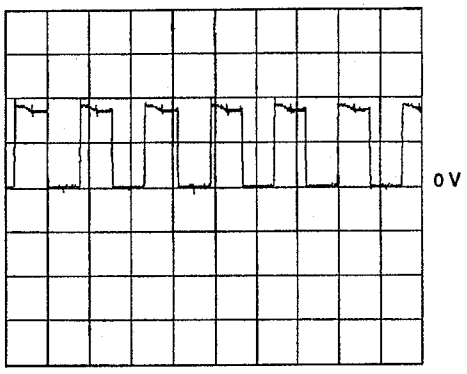
U6 Pin 8-Lg Jacket Models
U7 Pin 8-Sm Jacket Models
CARRIER MOTOR PHASE A

10 V/div 10 msec/div



U7 Pin 8-Lg Jacket Models
U6 Pin 8-Sm Jacket Models
ELEMENT MOTOR PHASE A

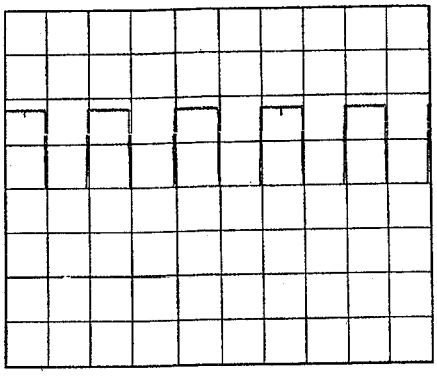
10 V/div 20 msec/div



U5 Pin 8-Both Models

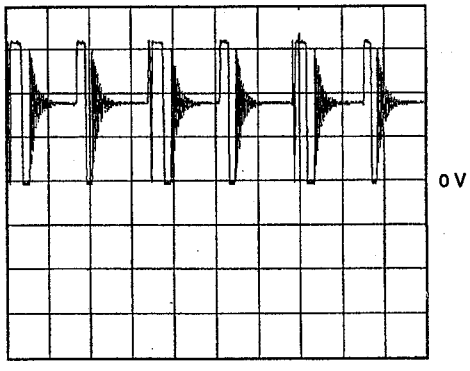
INDEX MOTOR PHASE A

10 V/div 5 msec/div



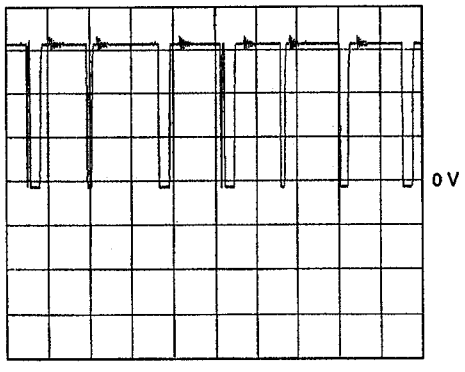
CR1 CATHODE
18 VOLT REGULATOR

10 V/div 20 µsec/div



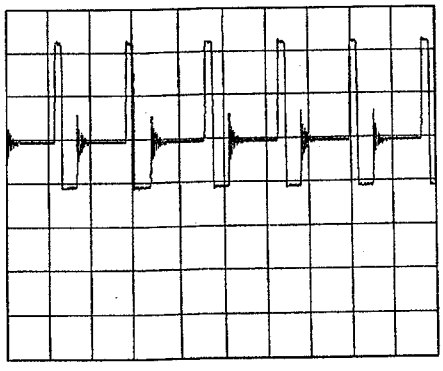
U3 Pin 1
18 VOLT REGULATOR

10 V/div 50 µsec/div



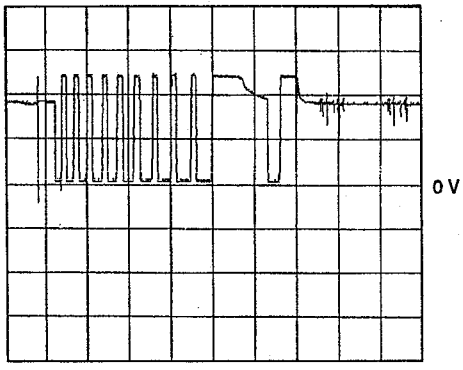
U4 Pin 2
5 VOLT REGULATOR

5 V/div 50 µsec/div



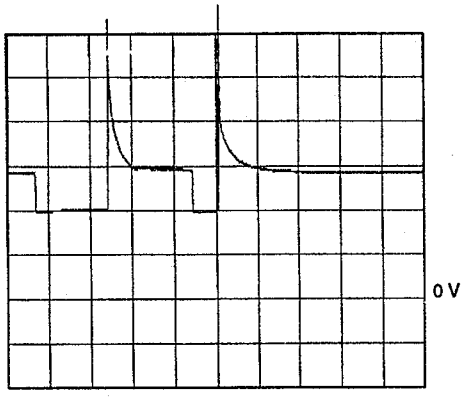
Q7 Collector-Lg Jacket Models
Q11Collector-Sm Jacket Models
RIBBON SOLENOID PULSE

10 V/div 10 msec/div



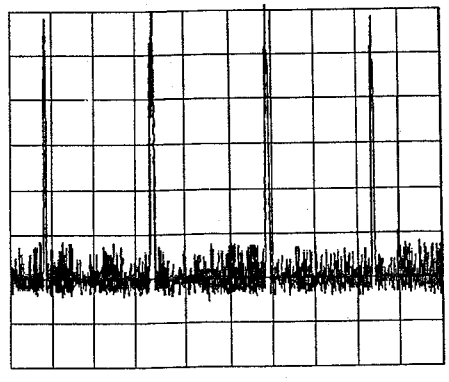
Q6 Drain-Lg Jacket Models
Q9 Collector-Sm Jacket Models
HAMMER SOLENOID PULSE

20 V/div 2 msec/div



U1 Pin 21
KEYBOARD SCANNING
ROW 6

1 V/div 2msec/div



COMPONENT DIAGRAM

COMPONENT LOCATION

VW2140 only

COMPONENT LOCATION CHART

COMPONENT	LOCATION
C1	B3
C2	B3
C3	A1
C4	A1
C5	A1
C6	A1
C7	A2
C8	A2
C9	A2
C10	A2
C11	A3
C12	A3
C13	B2
C14	B2
C15	B2
C16	B2
C17	A4

COMPONENT	LOCATION
CR1	A1
CR2	A2
CR3	A2
CR4	A3
CR5	A3
CR6	B1
CR7	B1
CR8	B2
CR9	B2
CR10	A3
CR11	A3
CR12	A4
CR13	A1

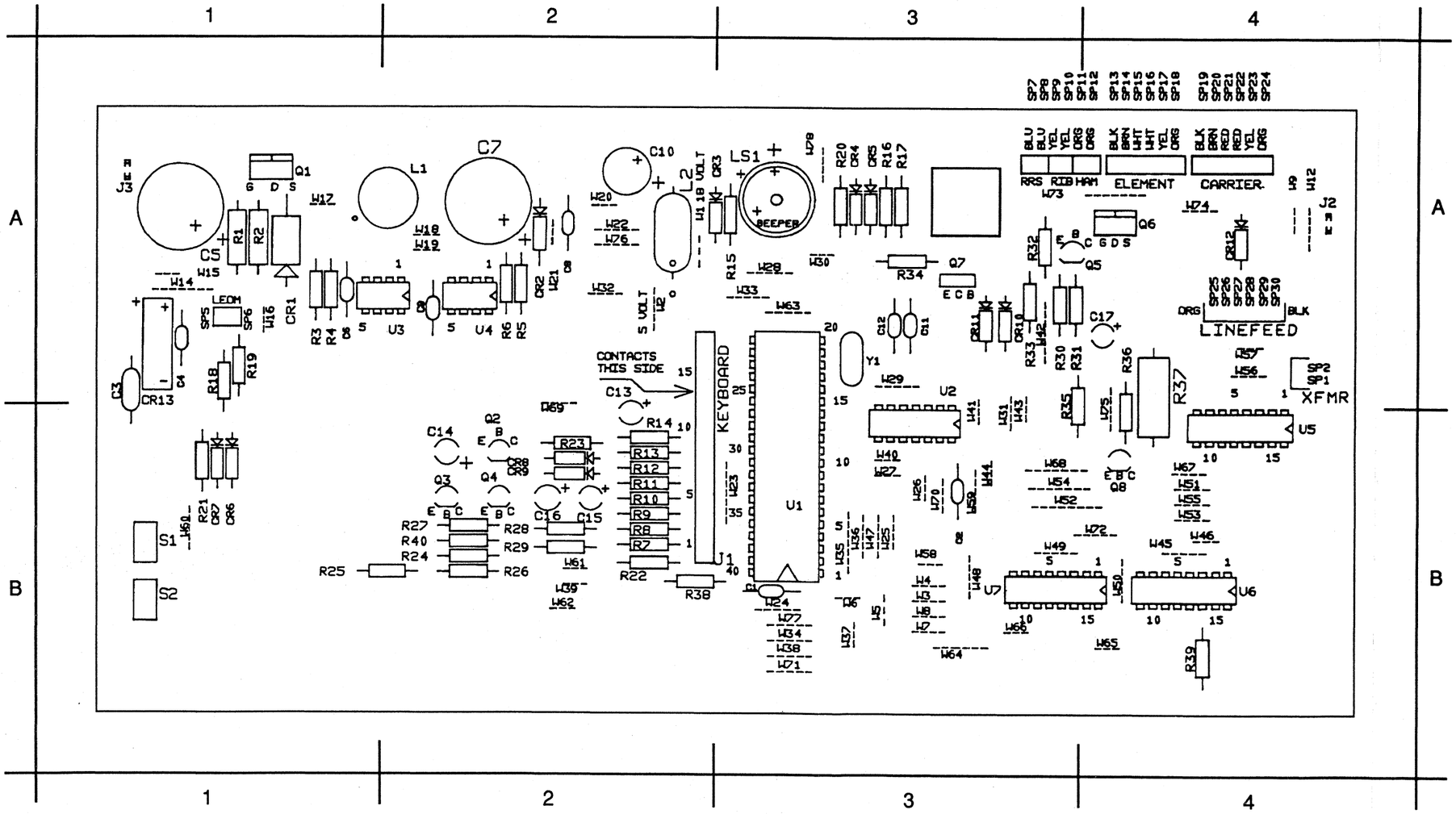
COMPONENT	LOCATION
L1	A2
L2	A2
LS1 (BEEPER)	A3
Q1	A1
Q2	B2
Q3	B2
Q4	B2
Q5	A3
Q6	A4
Q7	A3
Q8	B4

COMPONENT	LOCATION
R1	A1
R2	A1
R3	A1
R4	A1
R5	A2
R6	A2
R7	B2
R8	B2
R9	B2
R10	B2
R11	B2
R12	B2
R13	B2
R14	B2
R15	A3
R16	A3
R17	A3

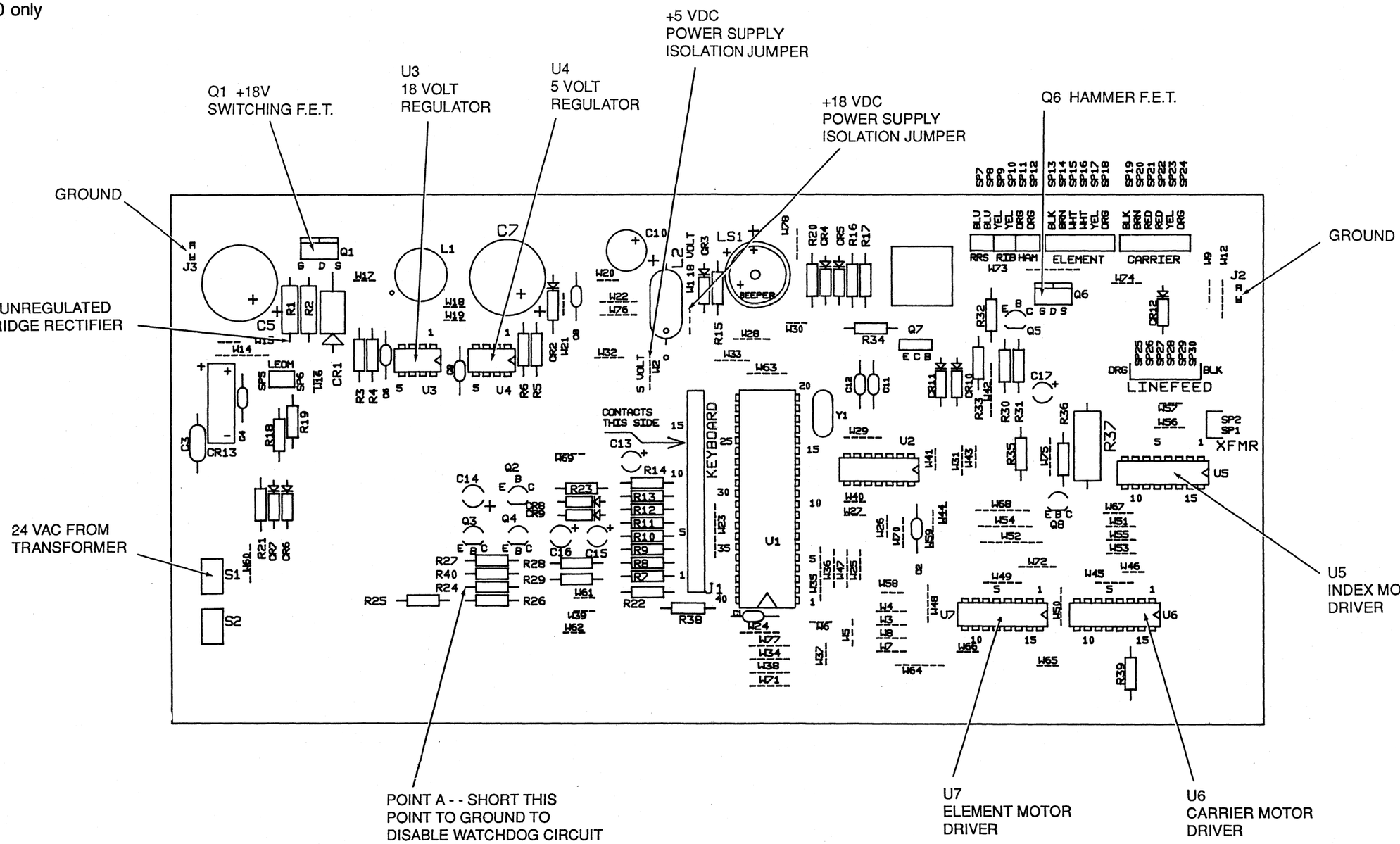
COMPONENT	LOCATION
R18	A1
R19	A1
R20	A3
R21	B1
R22	B2
R23	B2
R24	B2
R25	B2
R26	B2
R27	B2
R28	B2
R29	B2
R30	A3
R31	A3
R32	A3
R33	A3
R34	A3

COMPONENT	LOCATION
R35	A3
R36	B4
R37	A4
R38	B2
R39	B4
R40	B2
U1	B3
U2	B3
U3	A2
U4	A2
U5	B4
U6	B4
U7	B3

COMPONENT	LOCATION
Y1	A3
W1	A2
W2	A2
W3	B3
W4	B3
W5	B3



COMPONENT DIAGRAM
COMPONENT LAYOUT
VW2140 only

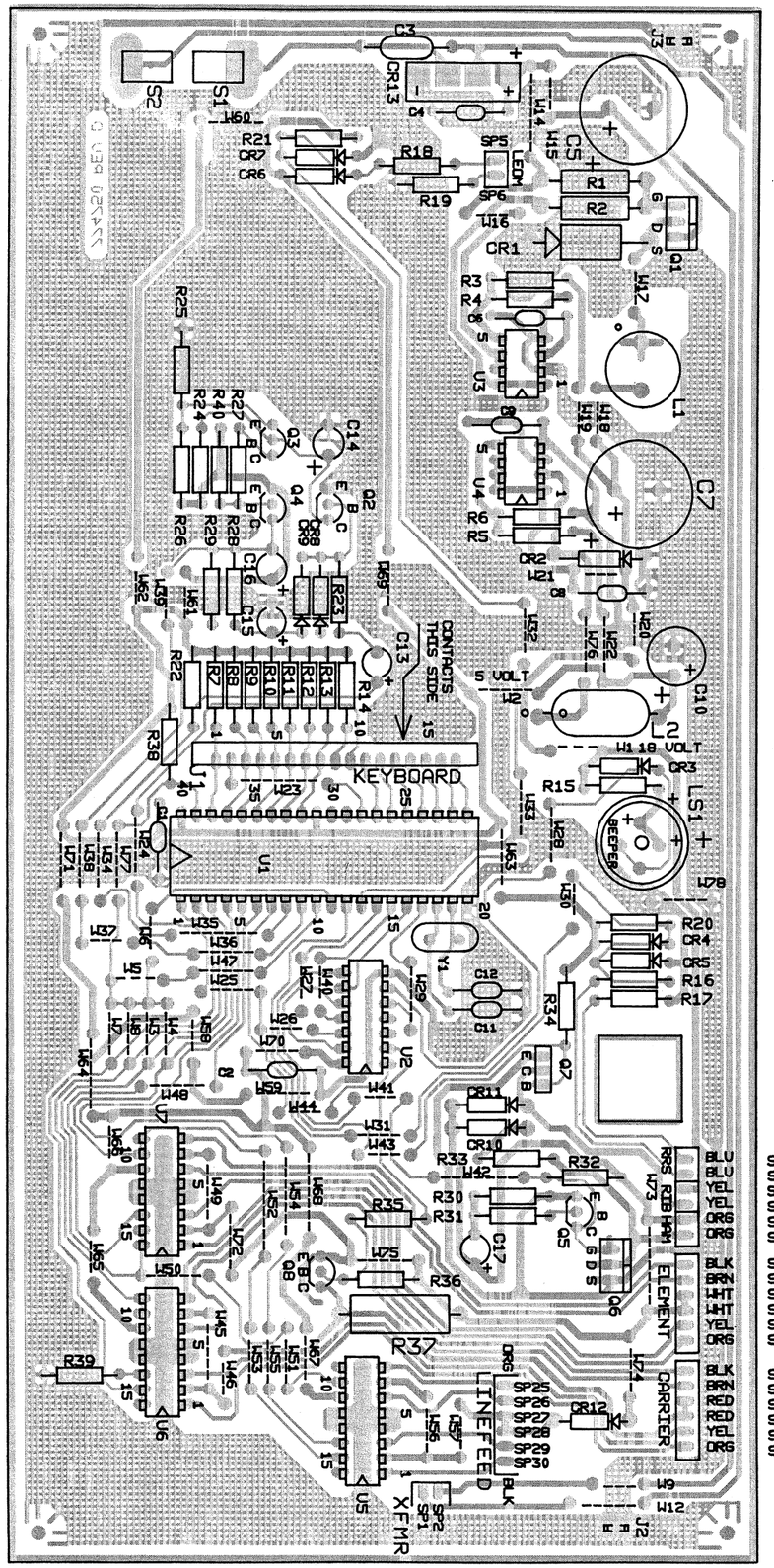


DIAGRAMS 7E-3

COMPONENT DIAGRAM

COMPONENT SIDE

VW2140 only

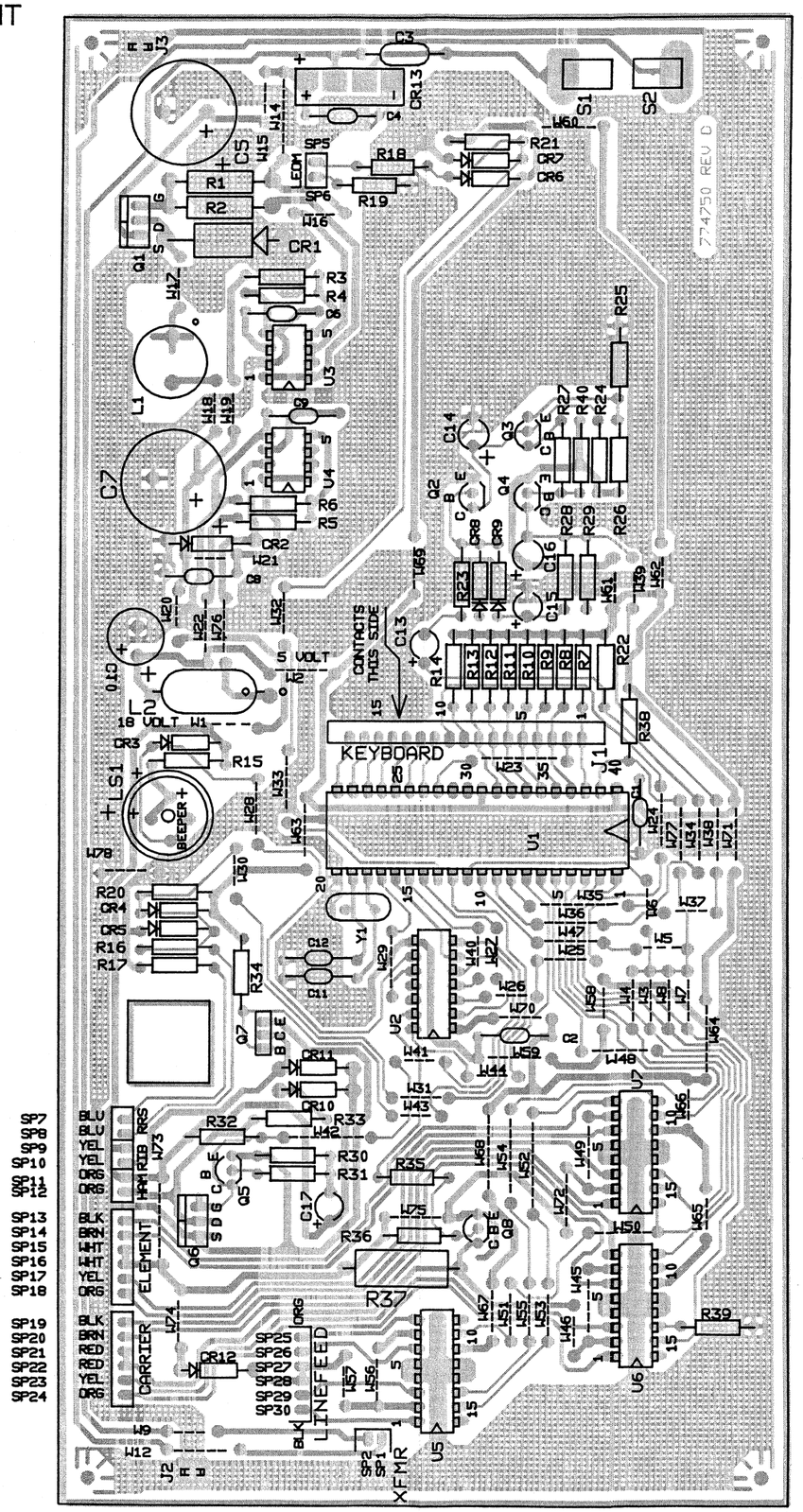


DIAGRAMS 7E-4

COMPONENT DIAGRAM

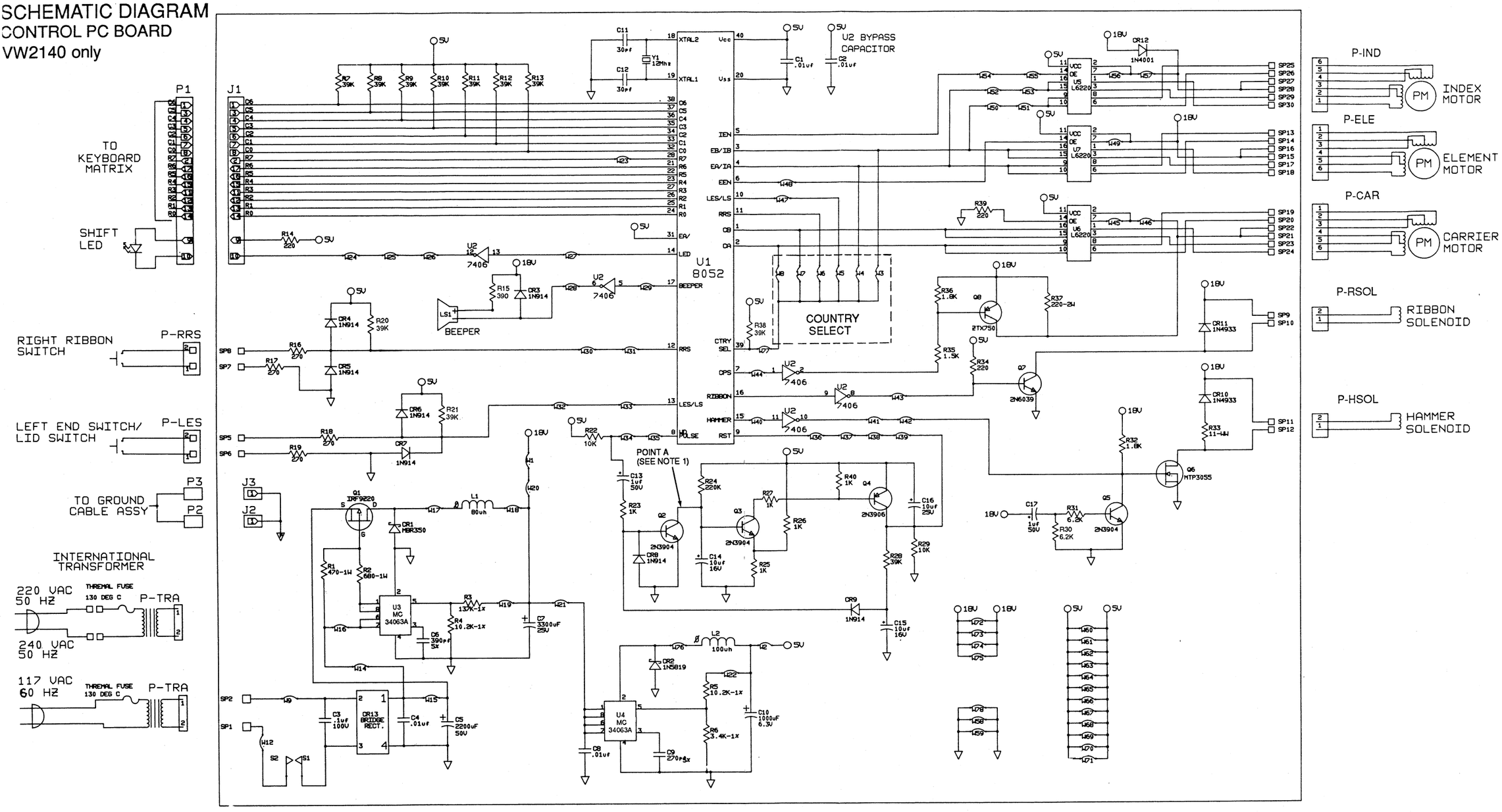
SOLDER SIDE

VW2140 only



CS 30 541

SCHEMATIC DIAGRAM
CONTROL PC BOARD
VW2140 only



NOTES:
1) To disable Watchdog circuit, short Point A to ground
2) All Resistor values are in Ohms
3) All Resistors are 1/4 Watt unless otherwise noted.

COUNTRY JUMPER CHART

COUNTRY	W3	W4	W5
USA, CANADA, FRENCH/CAN, SWISS/GERMAN, GERMANY DENMARK, UK, AUSTRALIA	IN	OUT	OUT
SWISS/FRENCH, FRANCE, HOLLAND, NORWAY, SPANISH/AM RUSSIA	OUT	IN	OUT
PORTUGAL, SPAIN, SWEDEN, ITALY, GERMANY(QUELLE)	OUT	OUT	IN

SECTION 8

DIAGRAMS VW2240

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	Component Layout	8E-2
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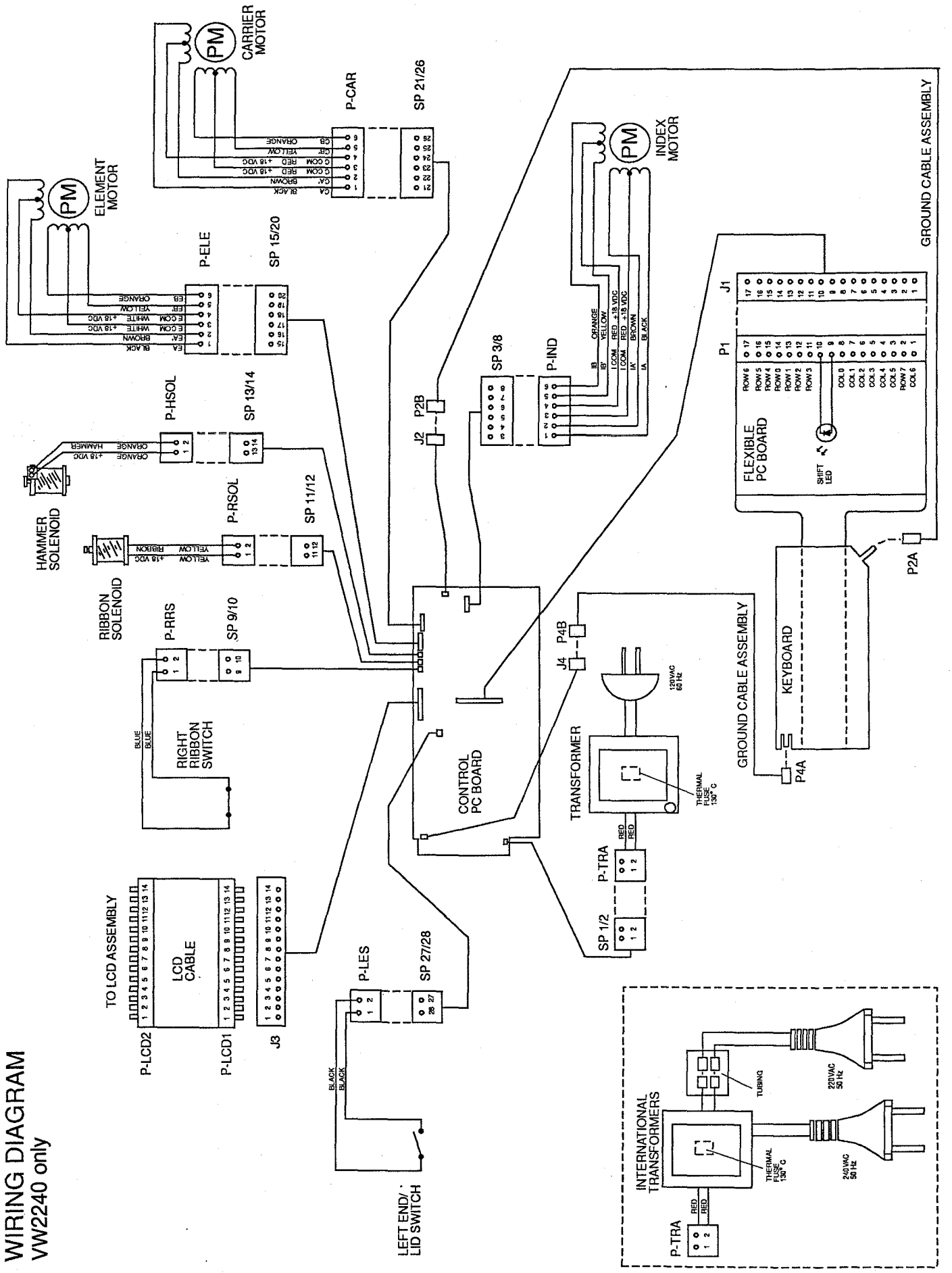
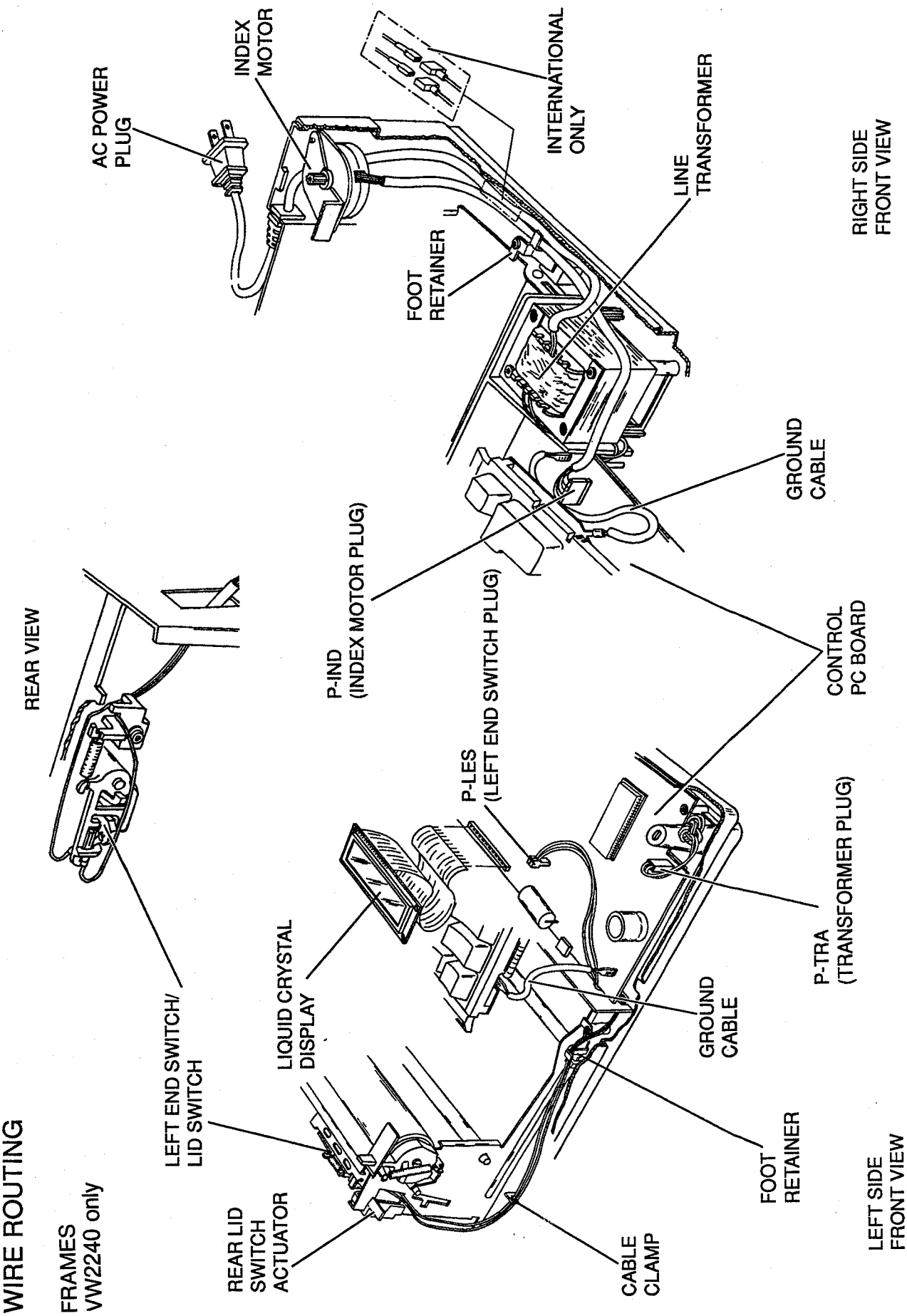
8F	SCHEMATIC	8F-1



WIRING DIAGRAM
VW2240 only

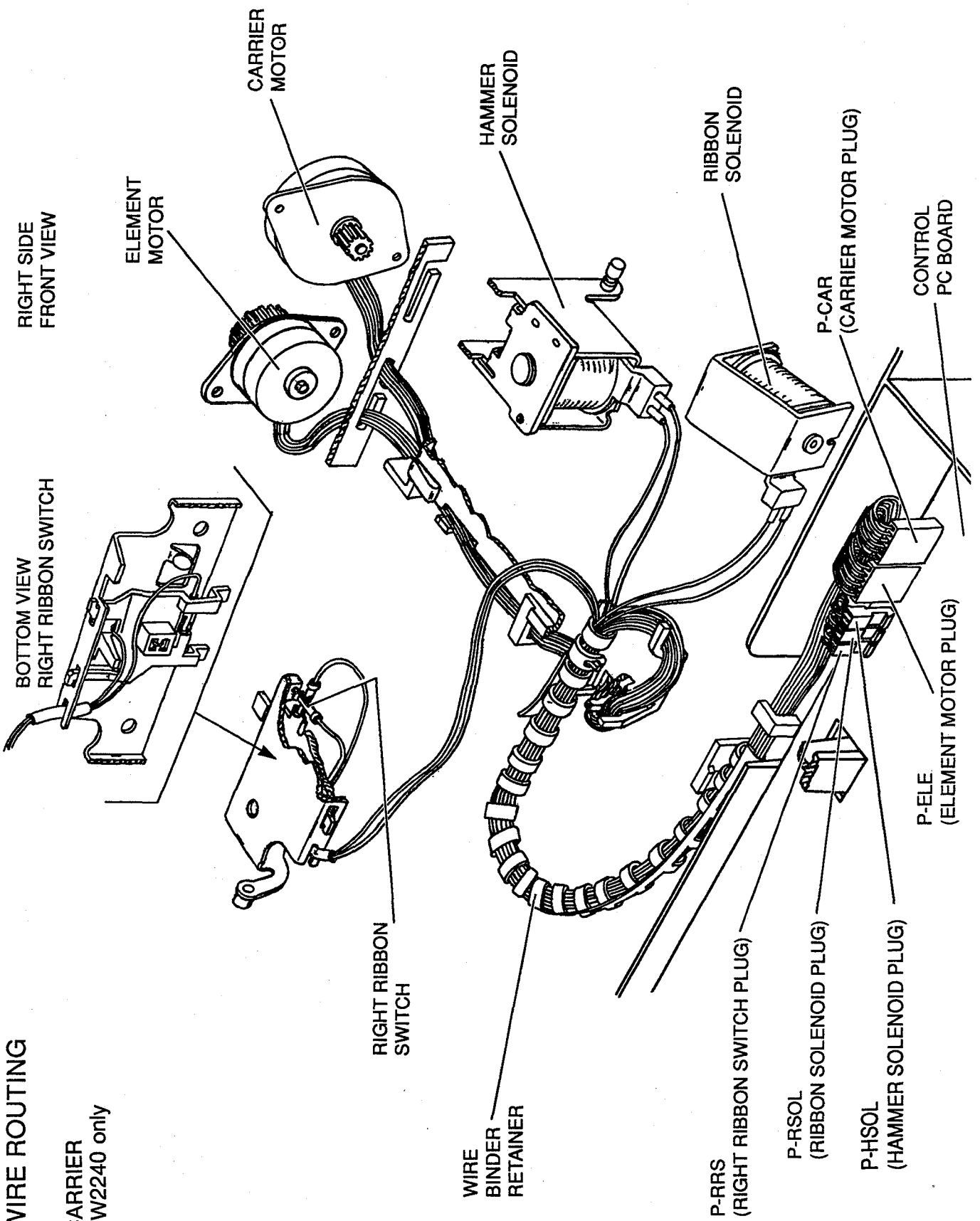
WIRE ROUTING

FRAMES
VW2240 only



WIRE ROUTING

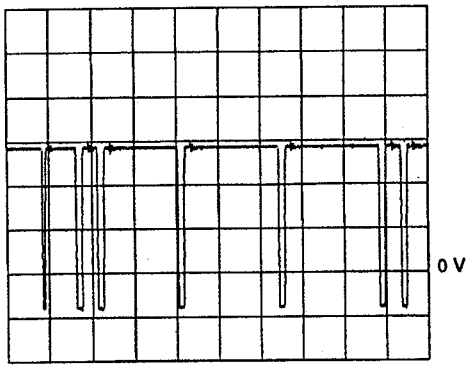
CARRIER
VW2240 only



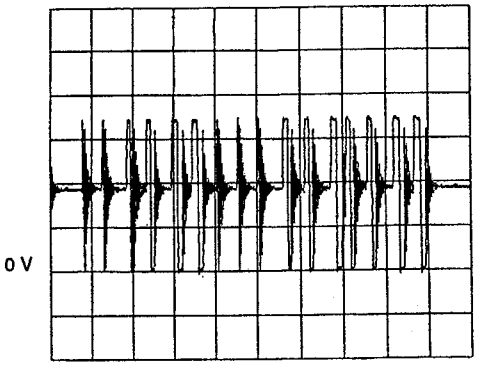
WAVE FORMS

VW2240 only

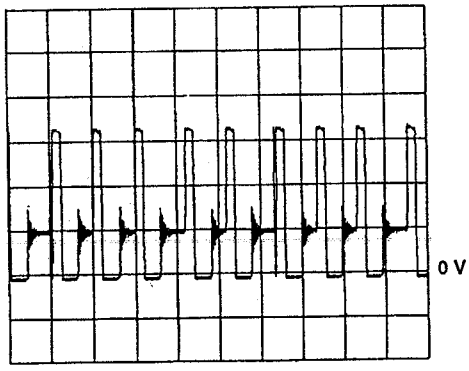
U7 PIN 1
18 VOLT REGULATOR
10 V/div 50 µsec/div



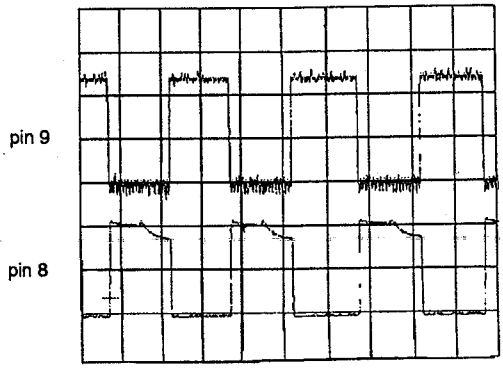
Q1 DRAIN
18 VOLT REGULATOR
10 V/div .2 msec/div



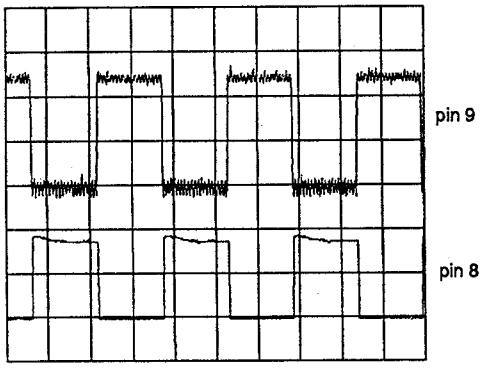
U8 PIN 2
5 VOLT REGULATOR
5V/div 50 µsec/div



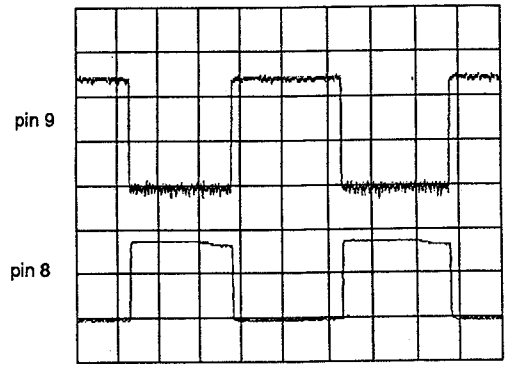
U13 PINS 8 & 9
CARRIER MOTOR PHASE A
2V/div Top 10 msec/div
10V/Div Bottom



U12 PINS 8 & 9
ELEMENT MOTOR PHASE A
2 V/div Top 10 msec/div
10V/Div Bottom



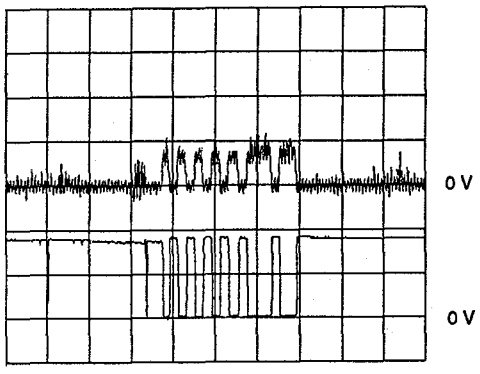
U11PINS 8 & 9
INDEX MOTOR PHASE A
2V/div Top 5msec/div
10v/div Bottom



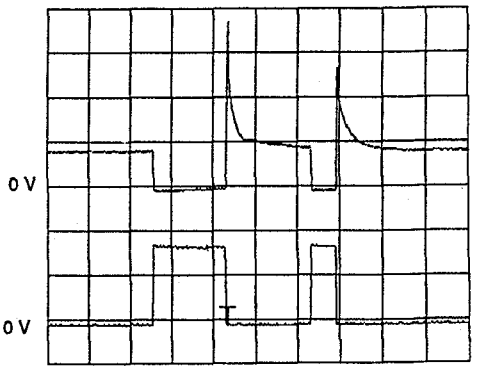
WAVE FORMS

VW2240 only

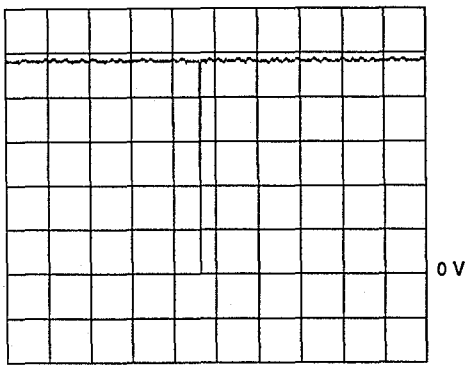
Top: Pin 8 U10
Bottom: Q8 COLLECTOR
RIBBON SOLENOID PULSE
2 V/div Top 10 msec/div
10V/div Bottom



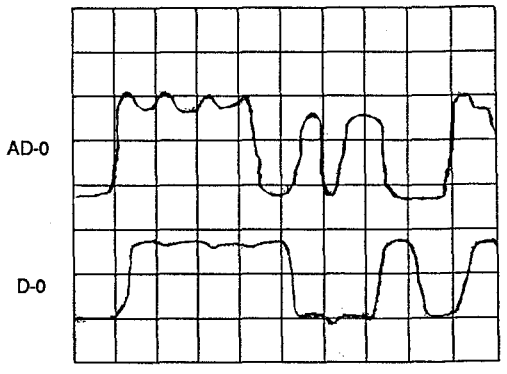
Top: Q10 DRAIN
Bottom: Pin 10 U10
HAMMER SOLENOID PULSE
20 V/div Top 2msec/div
!0v/div Bottom



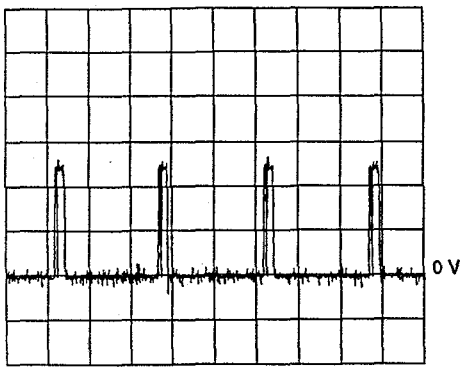
Pin 8 U2
WATCHDOG PULSE
1V/div .2 msec/div



ADDRESS/DATA LINE 0
DATA LINE 0
2 V/div .5 µsec/div



U2 PIN 21
KEYBOARD SCANNING
ROW 6
2 V/div 2 msec/div



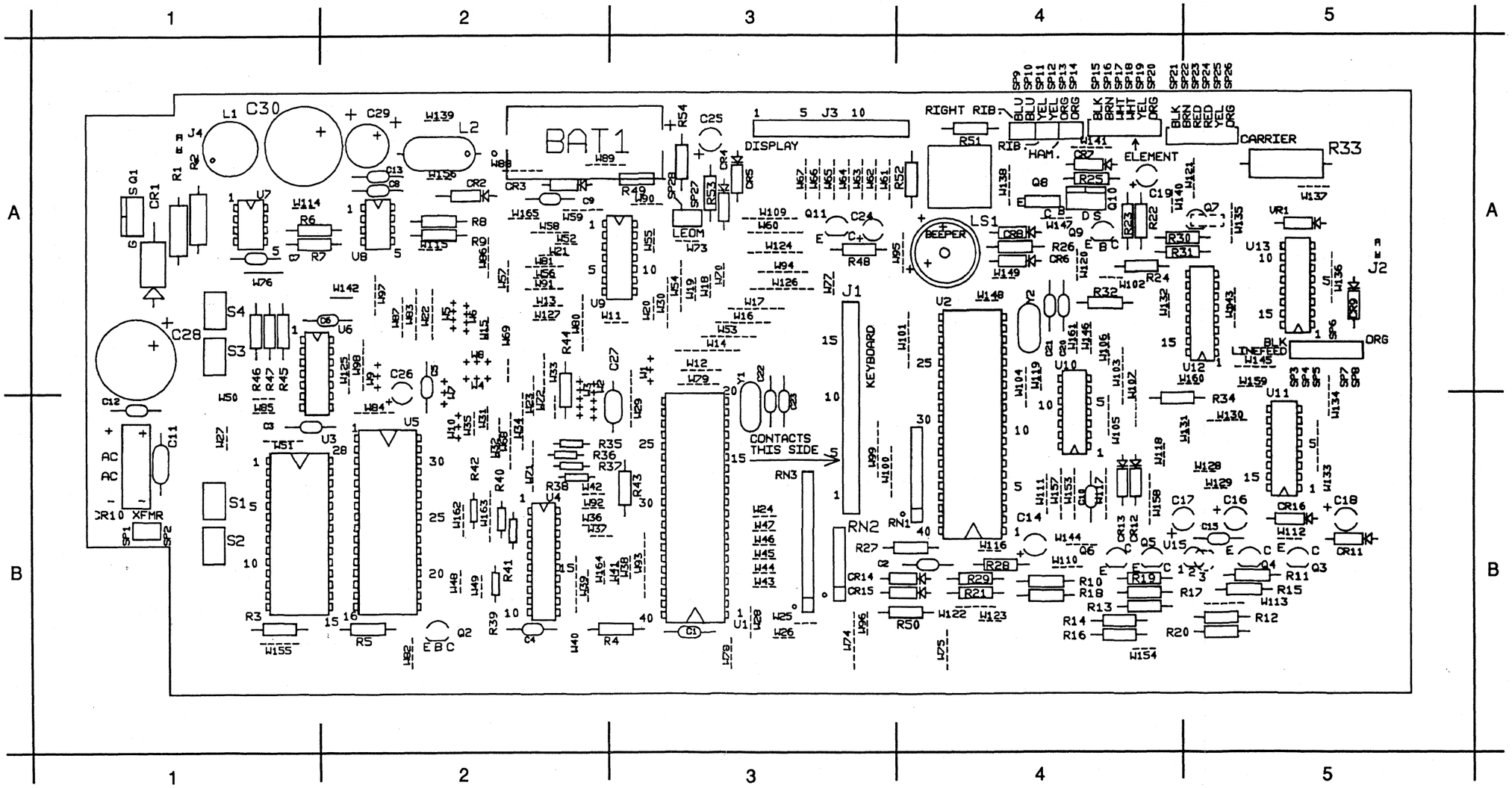
COMPONENT DIAGRAM

COMPONENT LOCATION

VW2240 only

COMPONENT LOCATION CHART

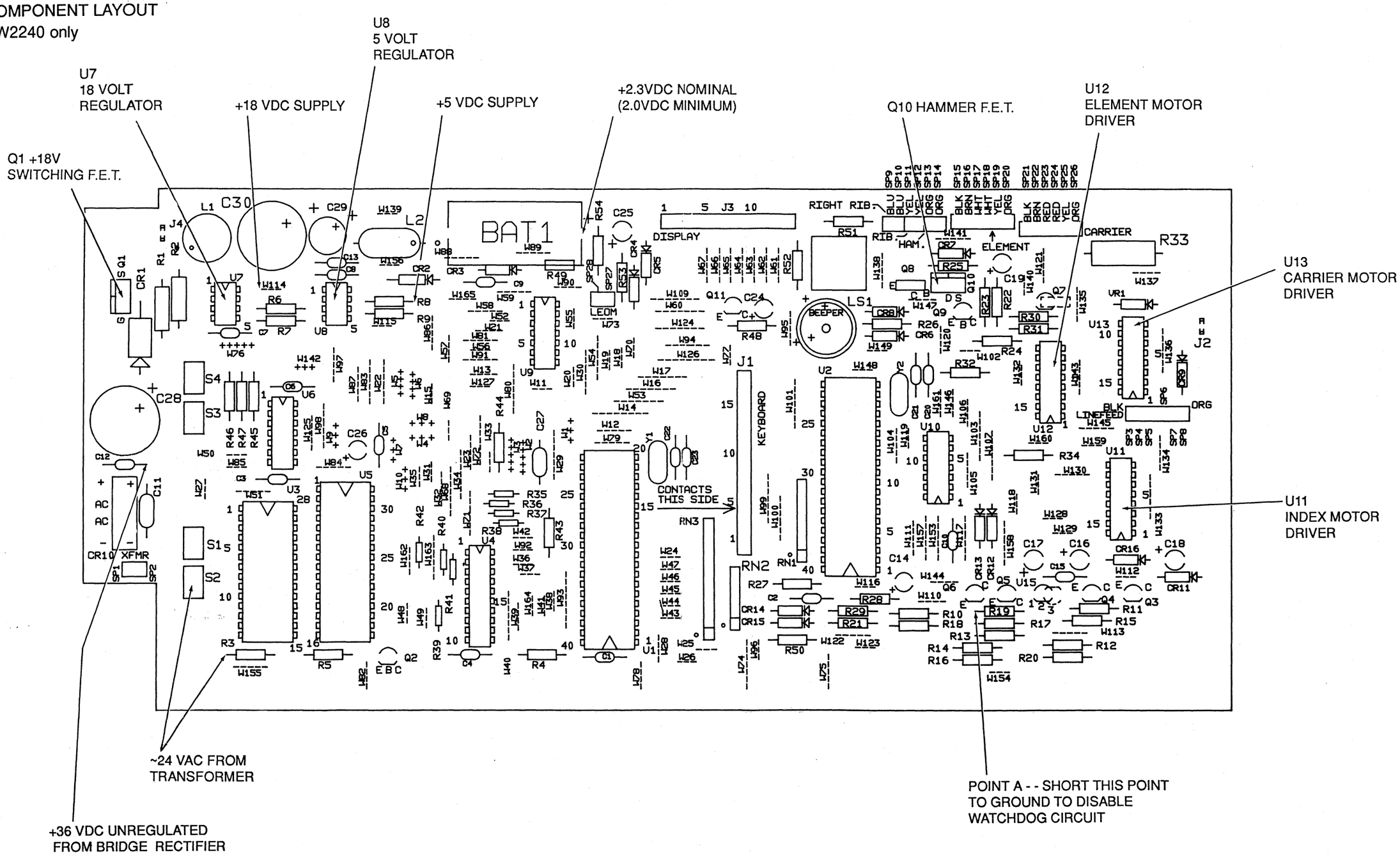
COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION
BAT1	A2	C22	B3	CR14	B4	R1	A1	R24	A4	R47	A1	U11	B5
		C23	B3	CR15	B4	R2	A1	R25	A4	R48	A3	U12	A5
C1	B3	C24	A3	CR16	B5	R3	B1	R26	A4	R49	A3	U13	A5
C2	B4	C25	A3			R4	B3	R27	B4	R50	B4	U15	B5
C3	B1	C26	A2	L1	A1	R5	B2	R28	B4	R51	A4		
C4	B2	C27	B3	L2	A2	R6	A1	R29	B4	R52	A4	VR1	A5
C5	A2	C28	A1			R7	A1	R30	A4	R53	A3		
C6	A2	C29	A2	LS1 (BEEPER)	A4	R8	A2	R31	A4	R54	A3	Y1	B3
C7	A1	C30	A1			R9	A2	R32	A4			Y2	A4
C8	A2			Q1	A1	R10	B4	R33	A5	RN1	B4		
C9	A2	CR1	A1	Q2	B2	R11	B5	R34	B4	RN2	B3	W1	A3
C10	B4	CR2	A2	Q3	B5	R12	B5	R35	B2	RN3	B3	W2	A2
C11	B1	CR3	A2	Q4	B5	R13	B4	R36	B2			W3	A2
C12	B1	CR4	A3	Q5	B4	R14	B4	R37	B2	U1	B3	W4	A2
C13	A2	CR5	A3	Q6	B4	R15	B5	R38	B2	U2	B4	W5	A2
C14	B4	CR6	A4	Q7	A5	R16	B4	R39	B2	U3	B1	W6	A2
C15	B5	CR7	A4	Q8	A4	R17	B4	R40	B2	U4	B2	W7	A2
C16	B5	CR8	A4	Q9	A4	R18	B4	R41	B2	U5	B2	W8	A2
C17	B5	CR9	A5	Q10	A4	R19	B4	R42	B2	U6	A1	W9	A2
C18	B5	CR10	B1	Q11	A3	R20	B5	R43	B3	U7	A1	W10	B2
C19	A4	CR11	B5			R21	B4	R44	A2	U8	A2		
C20	A4	CR12	B4			R22	A4	R45	A1	U9	A3		
C21	A4	CR13	B4			R23	A4	R46	A1	U10	B4		



COMPONENT DIAGRAM

COMPONENT LAYOUT

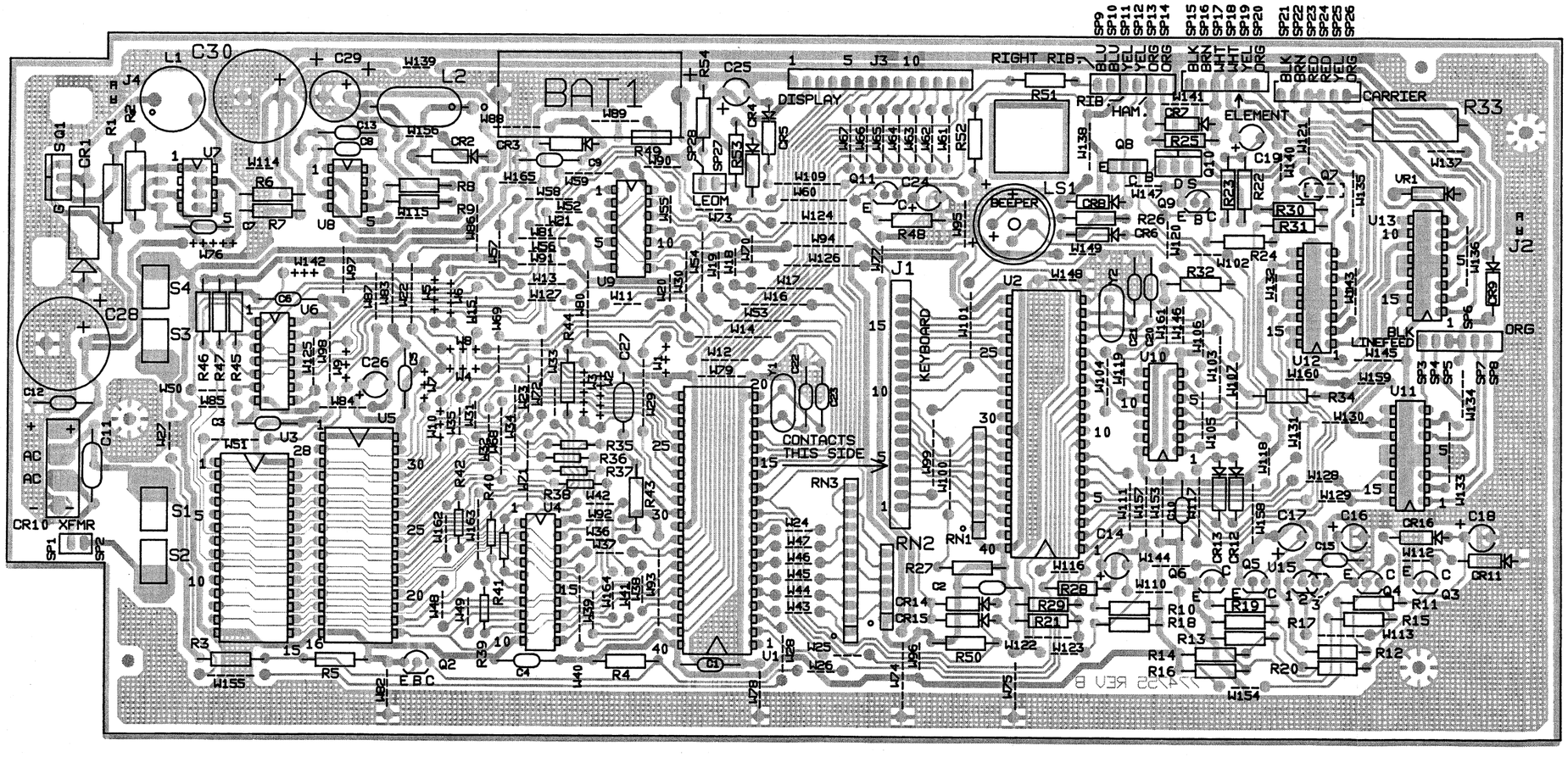
VW2240 only



COMPONENT DIAGRAM

COMPONENT SIDE

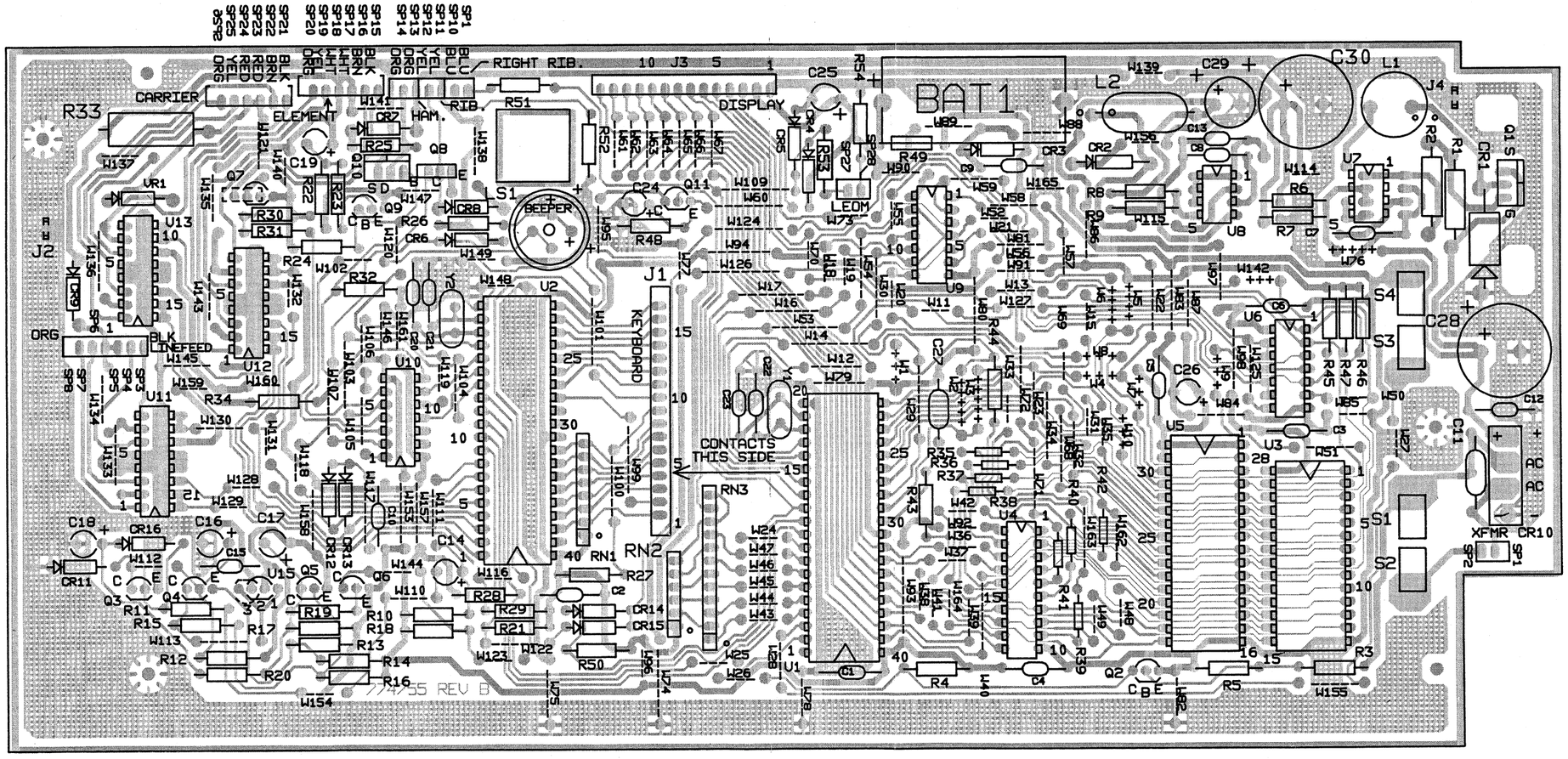
VW2240 only



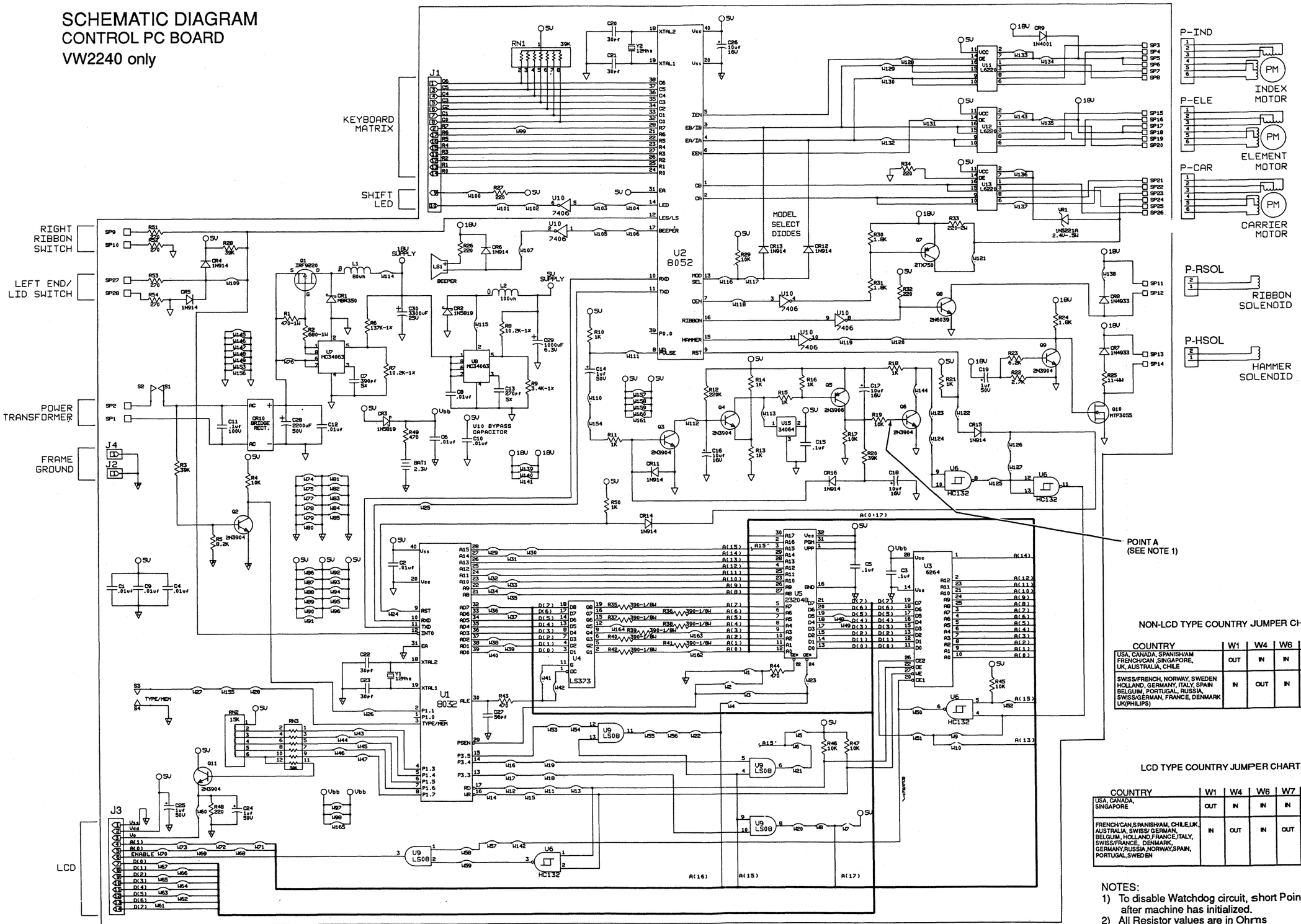
COMPONENT DIAGRAM

SOLDER SIDE

VW2240 only



SCHEMATIC DIAGRAM
CONTROL PC BOARD
VW2240 only



NON-LCD TYPE COUNTRY JUMPER CHART

W2 & W3 USE 390 OHM 1/8W RESISTOR, NOT JUMPER WIRE

COUNTRY	W1	W4	W6	W7	W8	W2	W3
USA, CANADA, SPANISH/AM FRENCH/CAN ,SINGAPORE, UK, AUSTRALIA, CHILE	OUT	IN	IN	IN	OUT	IN	OUT
SWISS/FRENCH, NORWAY, SWEDEN HOLLAND, GERMANY, ITALY, SPAIN BELGUIM, PORTUGAL, RUSSIA, SWISS/GERMAN, FRANCE, DENMARK UK(PHILIPS)	IN	OUT	IN	OUT	IN	OUT	IN

LCD TYPE COUNTRY JUMPER CHART

W2 & W3 USE 390 OHM 1/8W RESISTOR, NOT JUMPER WIRE

COUNTRY	W1	W4	W6	W7	W8	W9	W2	W3
USA, CANADA, SINGAPORE	OUT	IN	IN	IN	OUT	IN	IN	OUT
FRENCH/CAN,SPANISH/AM, CHILE,UK, AUSTRALIA, SWISS/ GERMAN, BELGUIM, HOLLAND,FRANCE,ITALY, SWISS/FRANCE, DENMARK, GERMANY,RUSSIA,NORWAY,SPAIN, PORTUGAL,SWEDEN	IN	OUT	IN	OUT	IN	IN	OUT	IN

NOTES:
1) To disable Watchdog circuit, short Point A to ground after machine has initialized.
2) All Resistor values are in Ohms
3) All Resistors are 1/4 Watt unless otherwise noted.

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SECTION 9

PARTSLIST

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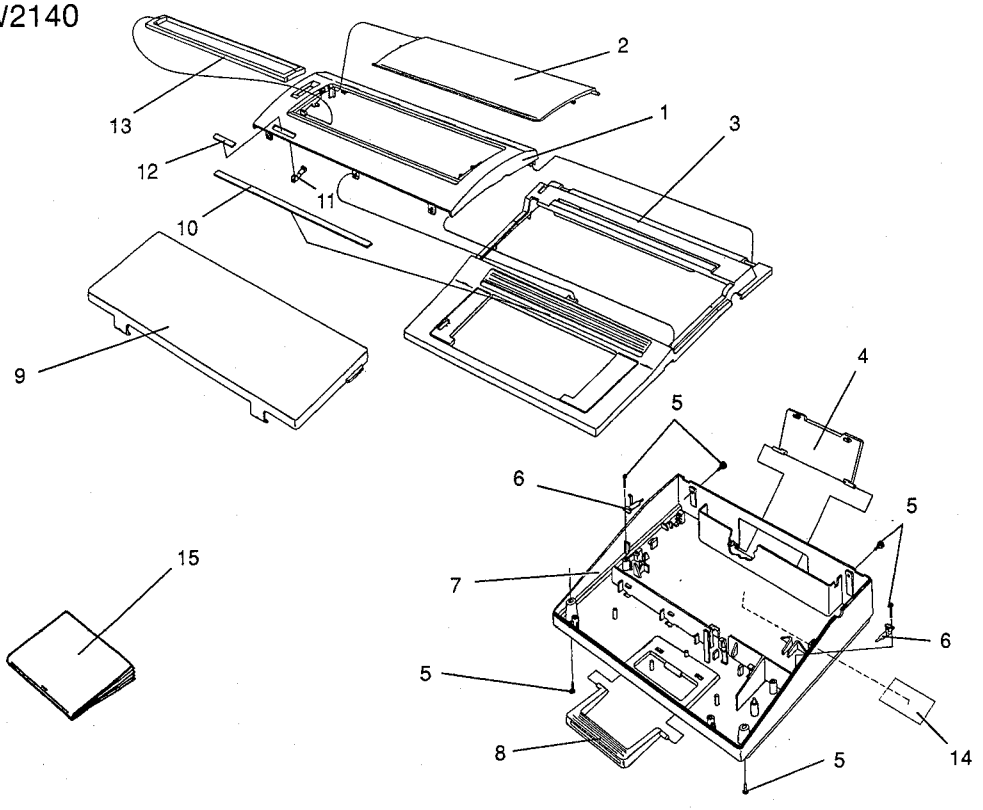
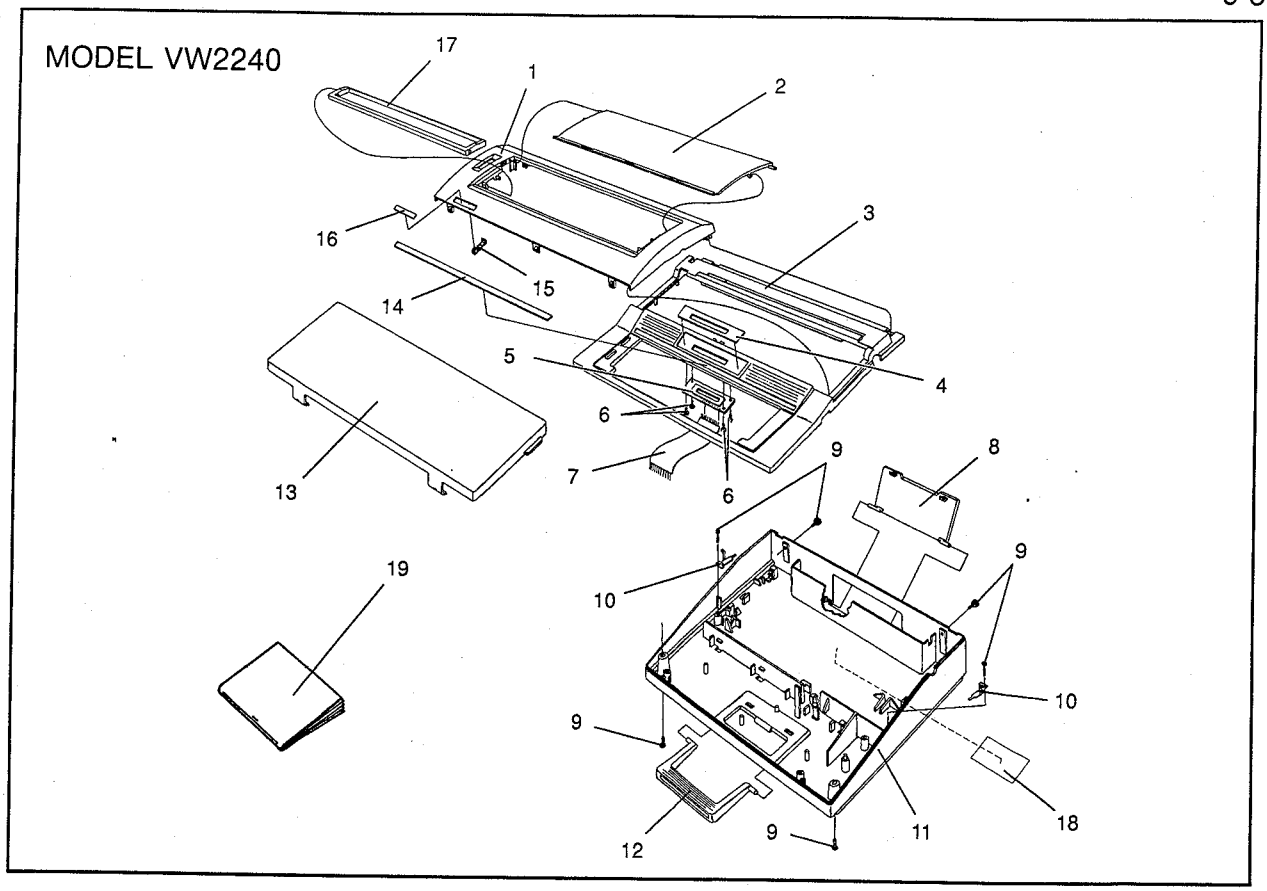
Electrical Partslist Model VW2140	9-15 + 9-16
Electrical Partslist Model VW2240	9-17 + 9-18

MODEL VW2140



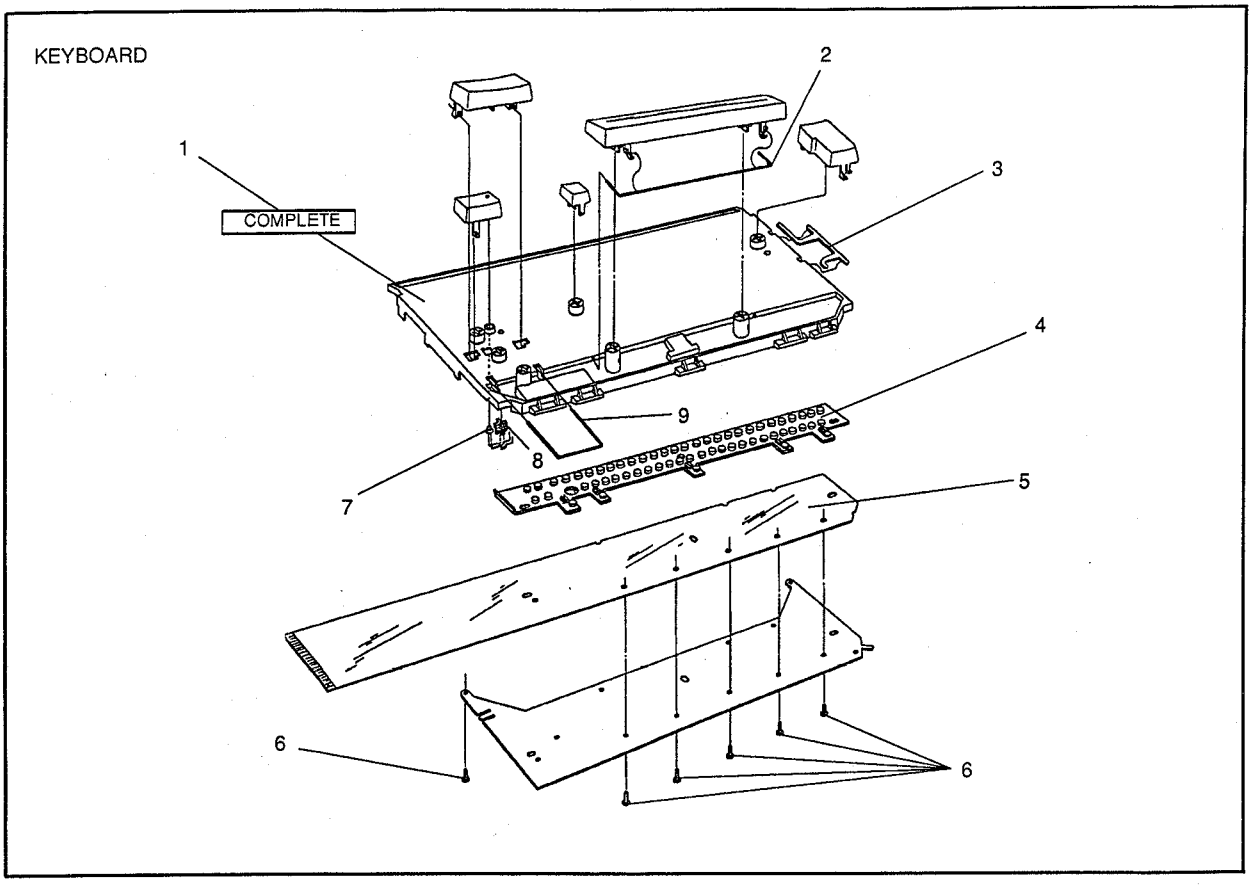
JACKETS VW2140

1	4822 432 40017	Deck cover
2	4822 432 40013	Paper support
3	4822 459 40668	Mask assembly
4	4822 432 40016	Cord door
5	4822 502 13246	Screw
6	4822 404 60646	Foot Retainer
7	4822 432 40012	Casing base
8	4822 498 30153	Casing base handle
9	4822 432 40014	keyboard cover
10	4822 459 40669	Overlay mask
11	4822 492 70165	Paper bail detent
12	4822 459 11007	Nameplate
13	4822 432 40015	Paper bail
15	4822 736 52291	Owners manual Dutch
15	....	For owner's manuals for other country's see SERVICE INFORMATION HO90-11



JACKETS VW2240

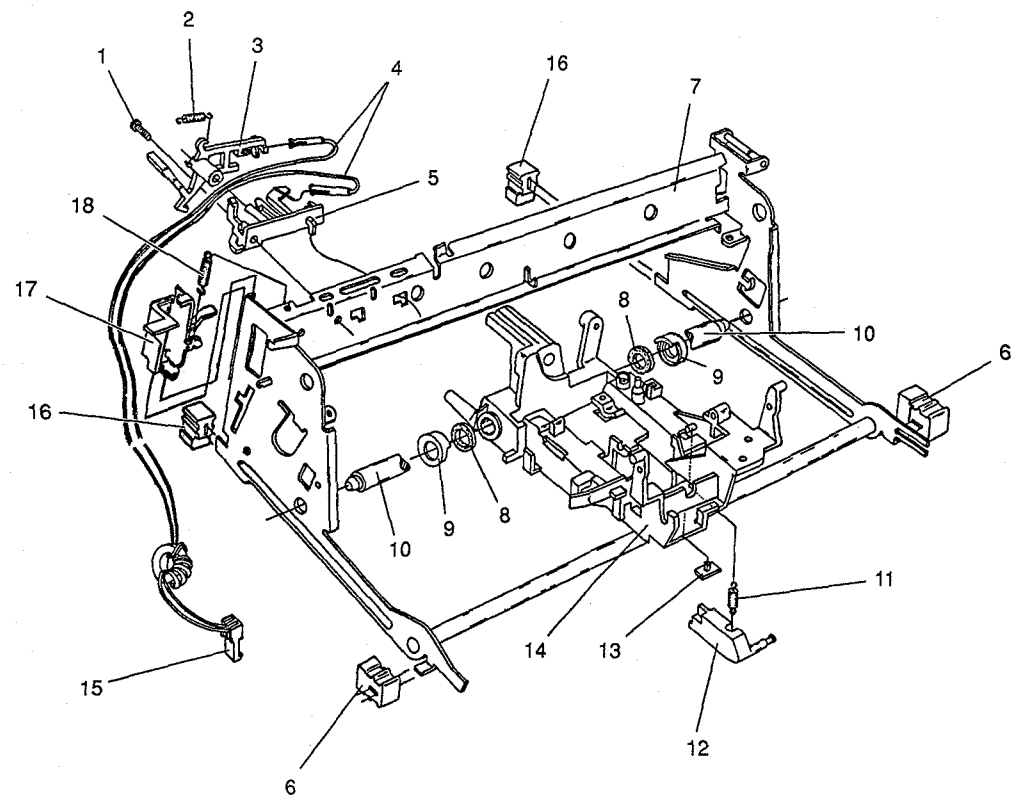
1	4822 432 40024	Deck cover
2	4822 432 40013	Paper support
3	4822 459 40671	Mask assembly
4	4822 450 61645	LCD overlay
5	4822 130 90929	16 character LCD
6	4822 502 13375	Screw for LCD
7	4822 320 50206	Flex circuit to LCD
8	4822 432 40016	Cord door
9	4822 502 13246	Screw
10	4822 404 60646	Food Retainer
12	4822 498 30153	Casing base handle
13	4822 432 40014	Keyboard cover
14	4822 432 40025	Mask overlay
15	4822 492 70165	Paper Bail Detent
16	4822 459 11012	Nameplate
17	4822 432 40023	Paper bail
19	4822 736 52317	Owner's manual Dutch
19	....	For owner's manual for other country,s see SERVICE INFORMATION HO90-11



KEYBOARD

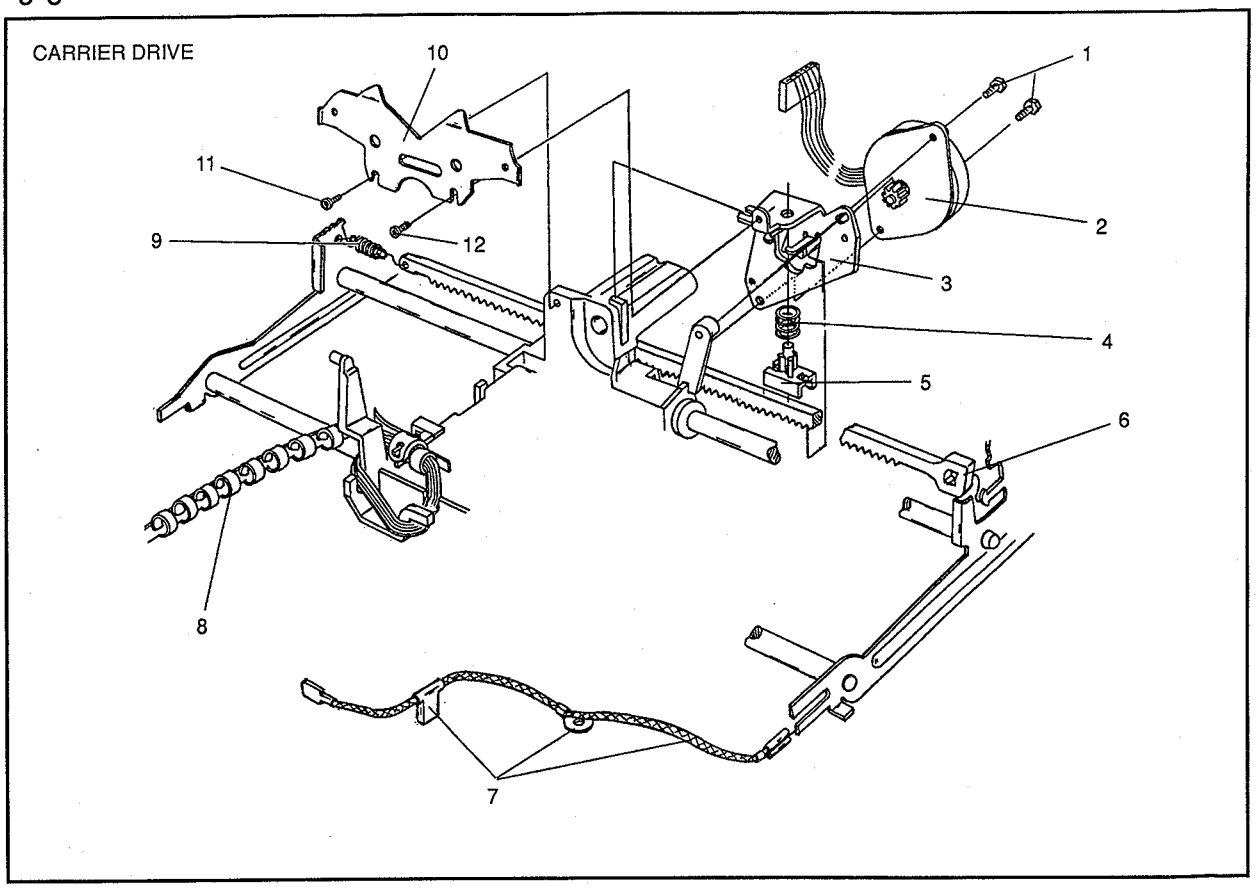
1	4822 219 82319	Keyboard complete VW2140/03 (Dutch)
1	4822 219 82344	Keyboard complete VW2240/03 (Dutch)
1	....	Keyboard complete for other country's see SERVICE INFORMATION HO90-11
4	4822 276 80362	Molded switches
5	4822 466 10568	Flexible circuit
6	4822 502 30587	Screw
7	4822 130 81329	Led (green)
8	4822 532 52171	Led contact washer

CARRIER MOLDING, RAILS,AND FRAMES



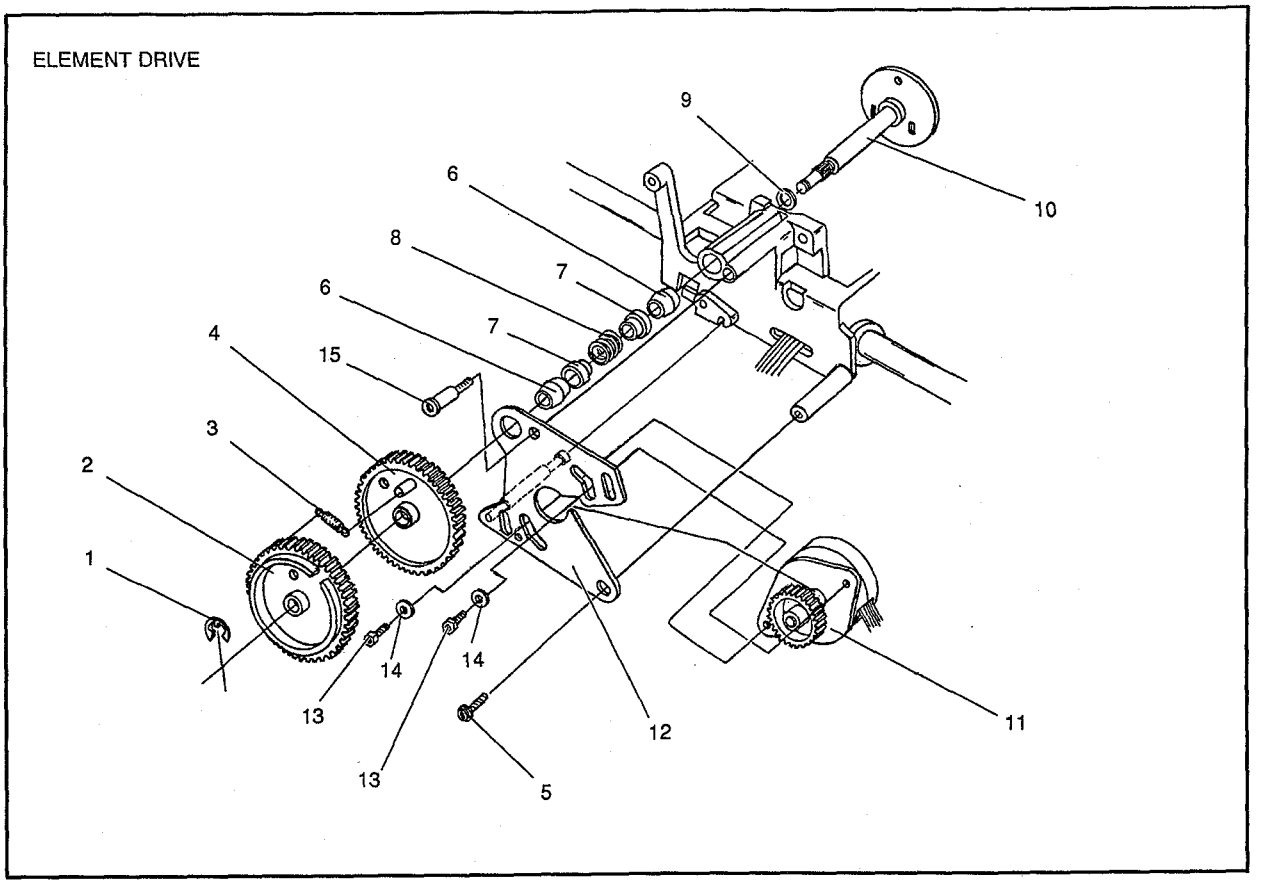
CARRIER MOLDINGS, RAILS AND FRAMES

2	4822 492 32982	Spring
3	4822 404 60594	Left end switch latch
4	4822 271 30663	Switch assembly
5	4822 404 60595	Bracket
6	4822 462 71581	Foot
8	4822 532 52082	Wiper
9	4822 530 70481	Wiper retainer
11	4822 492 33098	Spring
12	4822 404 60636	Carrier restraint
13	4822 404 60492	Slider
17	4822 691 10275	Actuator
18	4822 492 33096	Spring



CARRIER DRIVE

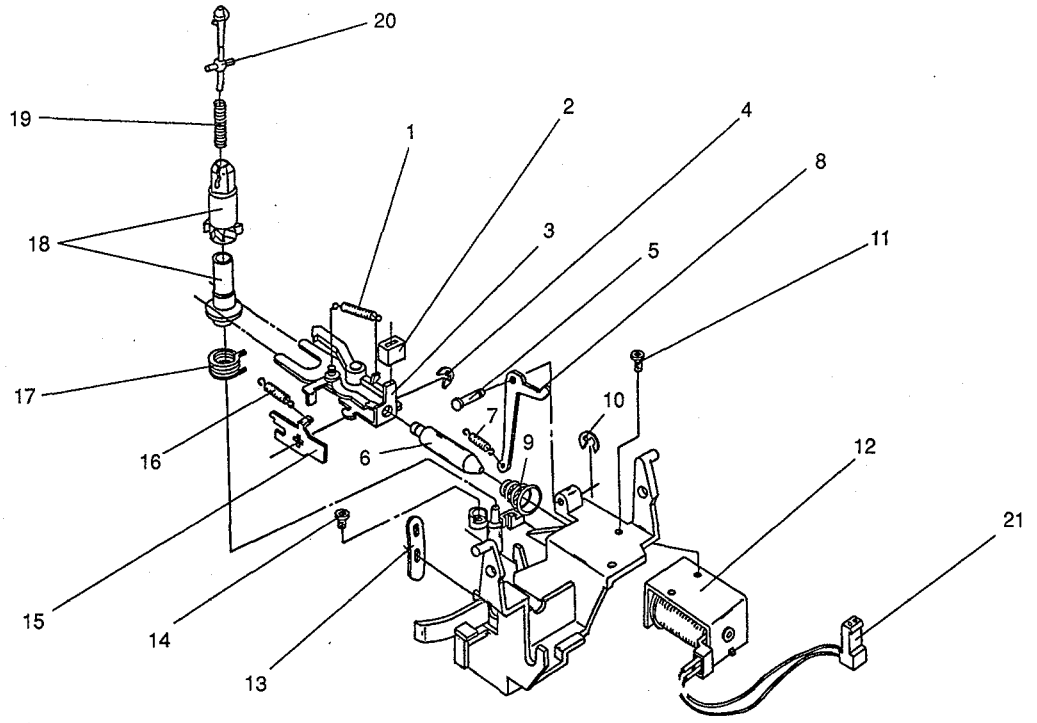
1	4822 502 13246	Screw
2	4822 361 21392	Carrier motor assy
4	4822 492 52131	Spring
5	4822 404 60587	Anti-backlash slider
9	4822 492 33095	Spring
10	4822 404 60637	Line indicator
11	4822 502 13252	Screw
12	4822 502 13376	Screw



ELEMENT DRIVE

1	4822 530 70479	E-ring
2	4822 522 32587	Scissor gear
3	4822 492 32993	Spring
4	4822 522 32586	Scissor gear
5	4822 502 13246	Screw
6	4822 520 30471	Bearing
7	4822 532 11699	Bearing retainer
8	4822 492 52063	Spring
9	4822 532 11701	Thrust washer
10	4822 535 71252	Element shaft
11	4822 361 21268	Element motor
13	4822 502 13251	Screw

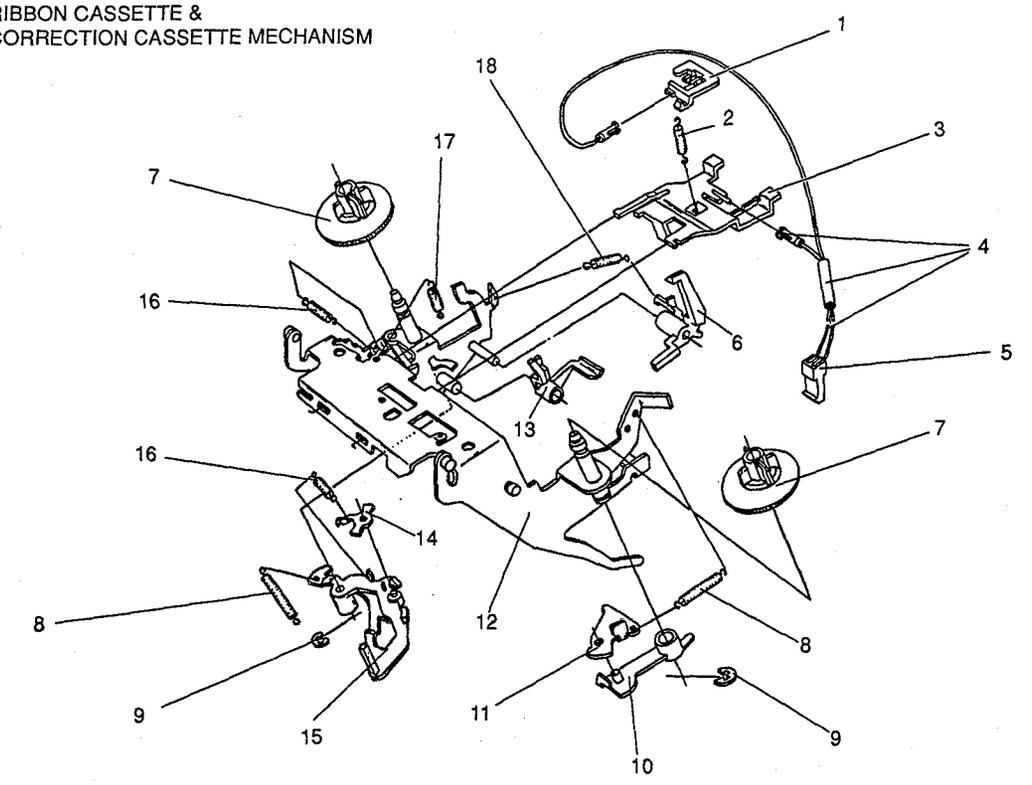
RIBBON DRIVE



RIBBON DRIVE

1	4822 492 32986	Spring
2	4822 462 71589	Bumper
3	4822 404 60603	Ribbon feed assembly
4	4822 530 70479	E-ring
5	4822 535 80794	Correction stud
6	4822 535 92581	Ribbon feed plunger
7	4822 492 32983	Spring
9	4822 492 70164	Plunger spring
10	4822 530 70487	E-ring
11	4822 502 30586	Screw
12	4822 281 50142	Ribbon drive solenoid
14	4822 502 13246	Screw
16	4822 492 32995	Spring
17	4822 492 42323	Spring
18	4822 535 71265	Ratchet/feet shaft
19	4822 492 42322	Spring
20	4822 535 92579	Ribbon driver

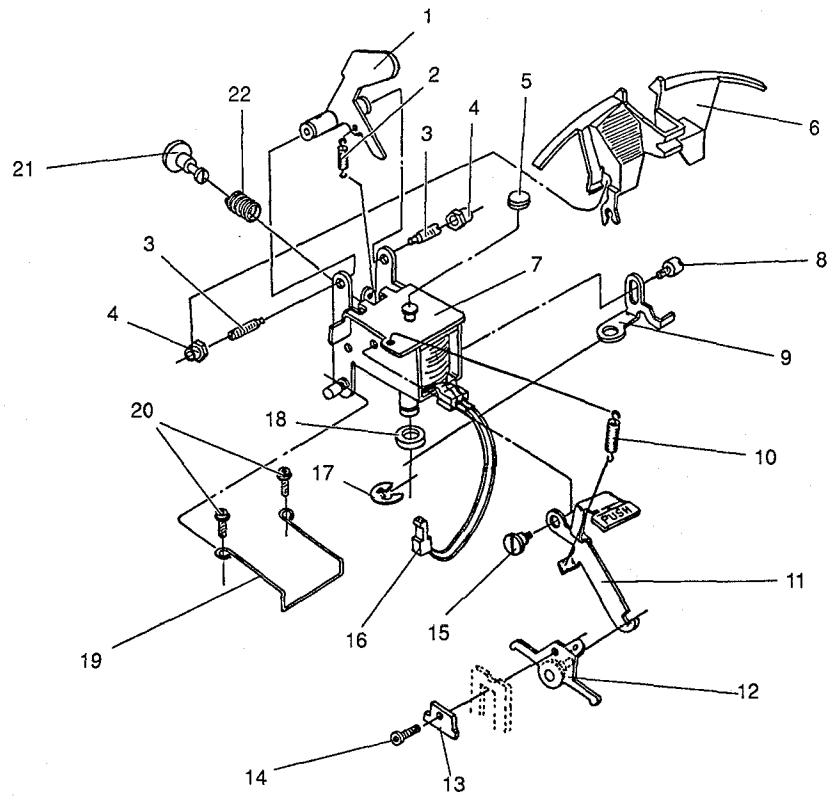
RIBBON CASSETTE &
CORRECTION CASSETTE MECHANISM



RIBBON CASSETTE AND CORRECTION MECHANISM

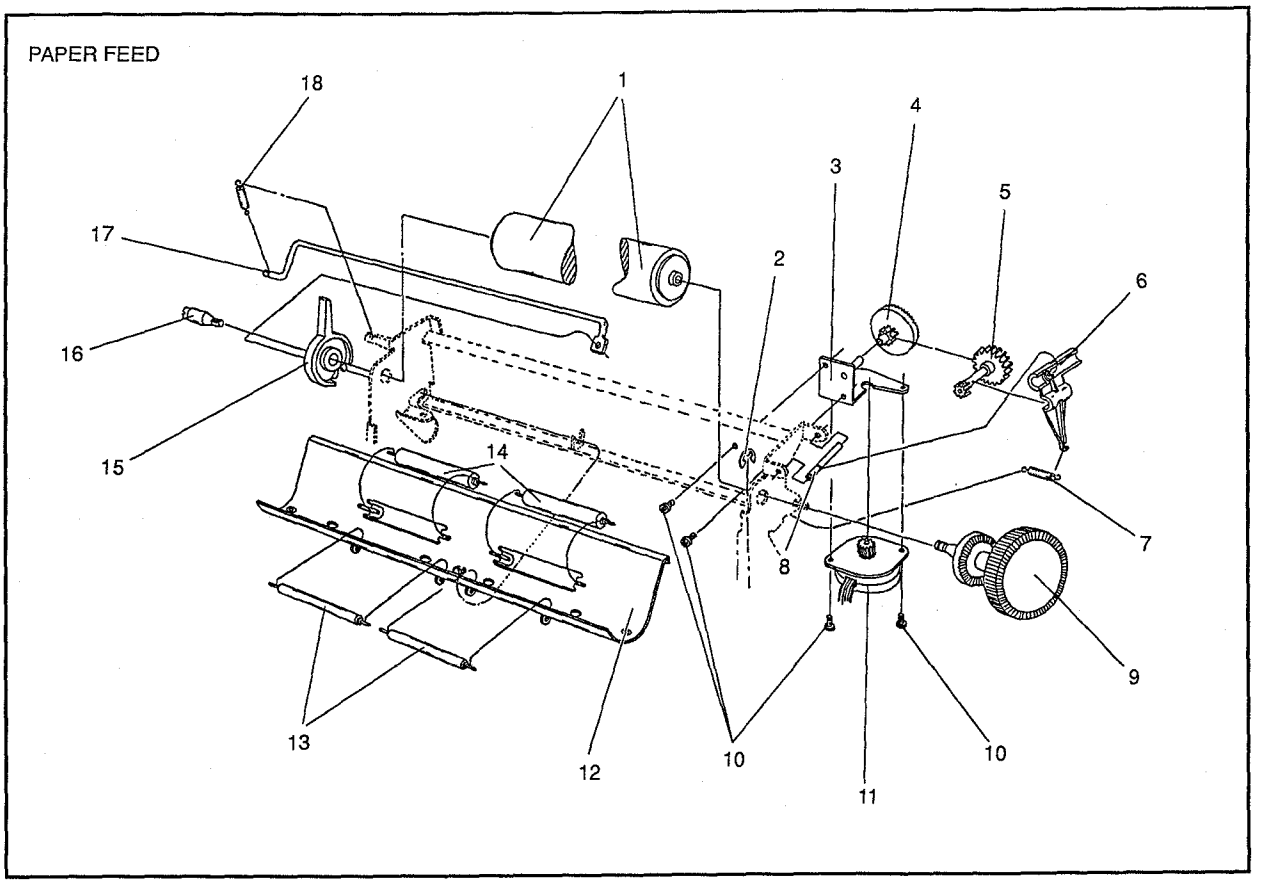
1	4822 404 60478	Switch holder
2	4822 492 32982	Spring
3	4822 404 60479	Lower switch holder
4	4822 321 23145	Switch wire assy
6	4822 404 60486	Cassette latch
7	4822 522 32592	Ribbon hub ratchet
8	4822 492 32998	Spring
9	4822 530 70492	E-ring
10	4822 404 60592	Tension carrier
11	4822 526 50105	Tension pawl
13	4822 404 60481	Feed arm
14	4822 526 50104	Feed pawl
15	4822 404 60483	Actuator
16	4822 492 32983	Spring
17	4822 492 32992	Spring
18	4822 492 32997	Spring

HAMMER



HAMMER

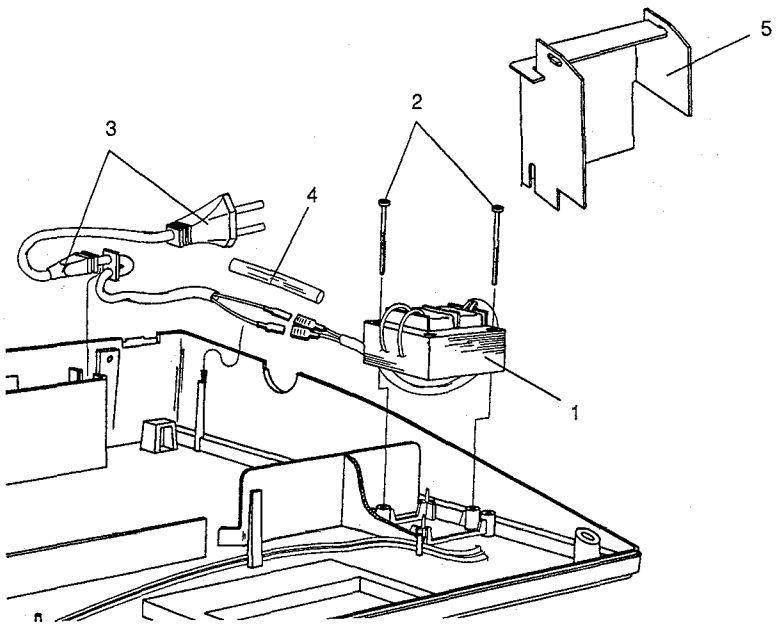
1	4822 404 60475	Hammer
2	4822 492 33097	Spring
3	4822 502 13214	Pivot screw
4	4822 505 10955	Pivot nut
5	4822 462 71583	Plunger cap
6	4822 256 91379	Ribbon guide
7	4822 281 50127	Hammer solenoid complete
8	4822 502 13215	Screw
9	4822 404 60476	Latch trip
10	4822 492 32994	Spring
11	4822 404 60647	Hammer latch lever
13	4822 459 80494	Washer
14	4822 502 13251	Screw
15	4822 502 13215	Screw
17	4822 530 70488	E-ring
18	4822 530 51118	O-ring
19	4822 492 70163	Retainer
20	4822 502 13246	Screw
21	4822 535 71253	Printwheel pusher
22	4822 492 52216	Pusher spring



PAPER FEED

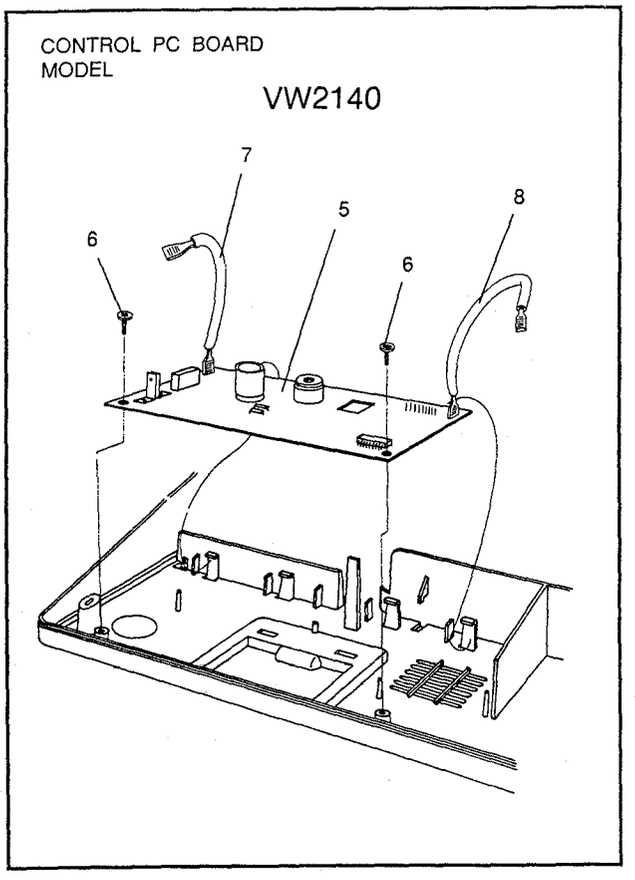
1	4822 528 70576	Platen assy
2	4822 530 70489	E-ring
3	4822 404 60591	Linespace bracket
4	4822 522 32589	Gear
5	4822 522 32588	Linespace pinion
6	4822 404 60589	Pinion pivot
7	4822 492 32988	Spring
9	4822 413 41616	Platen knob
10	4822 502 30585	Screw
11	4822 361 21203	Linespace motor
13	4822 528 81269	Roller (front)
14	4822 528 81417	Roller (rear)
15	4822 404 60602	Paper release lever
16	4822 502 13213	Left platen shaft
18	4822 492 32987	Spring

TRANSFORMERS
230V / 50Hz



TRANSFORMERS

3	4822 321 10597	Line cord
1	4822 146 21576	Transformer 230V VW2140
1	4822 146 21582	Transformer 230V VW2240

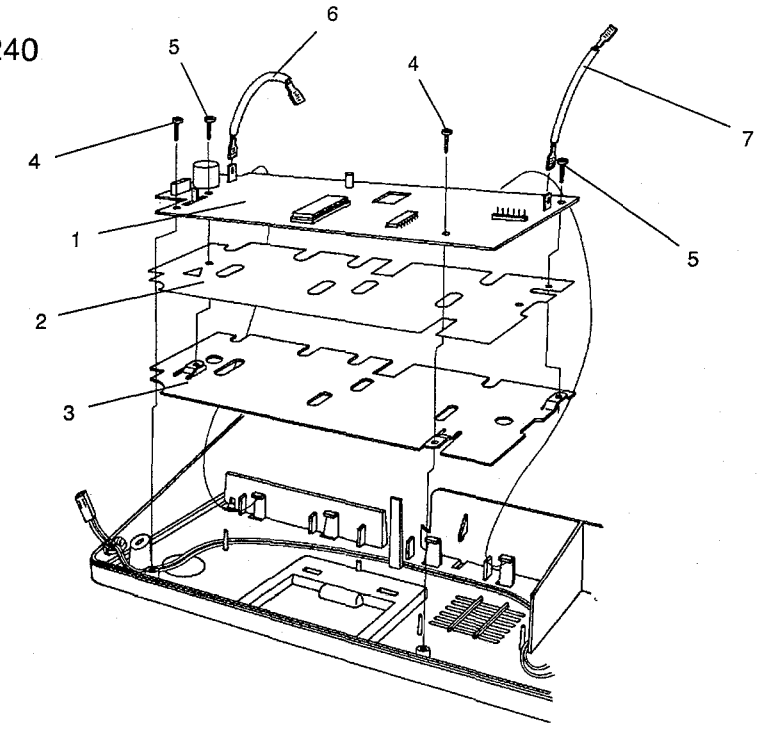


CONTROL PC BOARD

5	4822 212 60017	Complete PC Board VW2240 When ordering control PC Board also order U5 for country and model required. Watch jumper configuration !

CONTROL PC BOARD
MODEL

VW2240



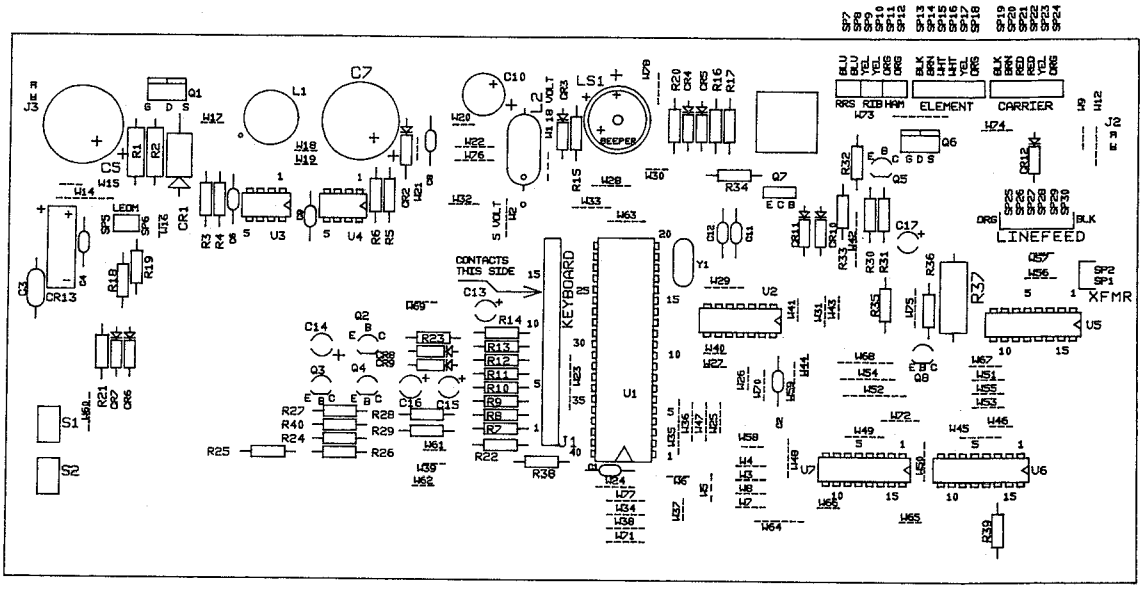
CONTROL PC BOARD

1	4822 219 82318	Complete PC Board VW2140 When ordering control PC Board also order U1 for country and model required.

COMPONENT LISTING
CONTROL P.C. BOARD

MODEL VW2140

P/N 775120



ELECTRICAL PARTSLIST VW2140

Q1	4822 130 61471	IRF9Z20
Q2-Q3	5322 130 40217	2N3904
Q4	5322 130 40731	2N3906
Q5	5322 130 40217	2N3904
Q6	4822 130 61844	MTP3055
Q7	4822 130 61469	2N6039
Q8	4822 130 62491	ZTX750

CR1	4822 130 81235	MBR350
CR2	4822 130 81234	1N5819
CR3-CR9	5322 130 31487	1N914
CR10-CR11	4822 130 81232	1N4933
CR12	4822 130 31438	1N4001
CR13	4822 130 81233	Bridge 4A 100V
		Integrated Circuits
U1	4822 209 63189	µP 8052AH for VW2140/03 (NL) VW2140/02 (D) and VW2140/19 (F)
U1	....	µP 8052AH for other country,s see SERVICE INFORMATION HO90-11
U2	4822 209 60056	7406
U3-U4	4822 209 60059	MC34063A
U5-U7	4822 209 60058	L-6220

R1	4822 116 81036	470Ω 1W 5%
R2	4822 116 81037	680Ω 1W 5%
R3	4822 116 81125	137KΩ 1/4W 1%
R4-R5	4822 116 81126	10K2 1/4W 1%
R6	4822 116 82055	3K4 1/4W 1%
R37	4822 116 81134	220Ω 2W 5%

L1	4822 157 60374	80uH 6A
L2	4822 157 53909	100uH

C5	4822 124 41691	Elco 2200uF 50V
C7	4822 124 23083	Elco 3300uF 25V
C10	4822 124 41687	Elco 1000uF 6.3V

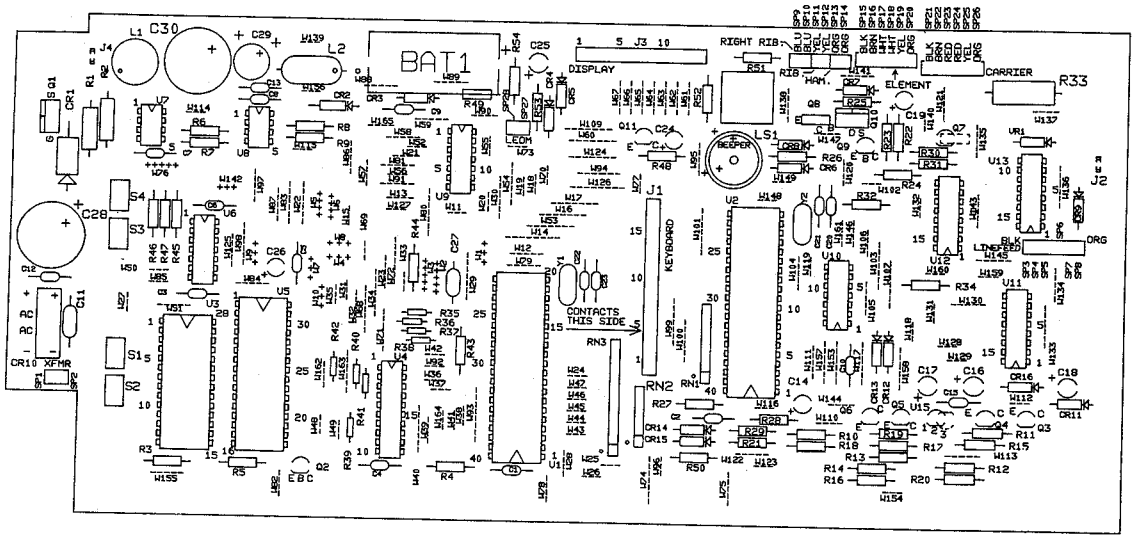
Various

LS1	4822 280 10205	Buzzer
S1	4822 271 30665	Spring se.contact
S2	4822 271 30665	Spring se.contact
SP1-SP28	4822 268 10268	Stake pin contact
Y1	4822 242 72912	Resonator 12MHz
J1	4822 321 23144	Connector

COMPONENT LISTING
CONTROL P.C. BOARD

MODEL VW2240

P/N 774849



ELECTRICAL PARTSLIST VW2240

Q1	4822 130 61471	IRF9Z20
Q2-Q4	5322 130 40217	2N3904
Q5	5322 130 40731	2N3906
Q6	5322 130 40217	2N3904
Q7	4822 130 62491	ZTX750
Q8	4822 130 61469	2N6039
Q9	5322 130 40217	2N3904
Q10	4822 130 61844	MTP3055
Q11	4822 130 40217	2N3904

R1	4822 116 81036	470Ω 1W 5%
R2	4822 116 81037	680Ω 1W 5%
R6	4822 116 81125	137KΩ 1/4W 1%
R7-R8	4822 116 81126	10K2 1/4W 1%
R9	4822 116 82055	3K4 1/4W 1%
R33	4822 116 81134	220Ω 2W 5%
RN1	4822 111 91806	7x39K Network
RN2	4822 111 91808	5x15K Ladder
RN3	4822 111 91807	6x30K Pack

ELECTICAL PARTSLIST
VW2240

CR1	4822 130 81235	MBR350
CR2-CR3	4822 130 81234	1N5819
CR4-CR6	5322 130 31487	1N914
CR7-CR8	4822 130 81232	1N4933
CR9	4822 130 31438	1N4001
CR10	4822 130 81233	Bridge rect. 4A 100V
CR11	5322 130 31487	1N914
CR12	4822 130 31438	1N4001
CR14-CR16	5322 130 31487	1N914

U1	4822 209 60085	µP 8032AH
U2	4822 209 63313	µP 8052AH
U3	4822 209 60087	6264 8Kx8 RAM
U5	4822 209 51937	2 Meg ROM for VW2240/03 (NL) 2 Meg ROM for other country,s see SERVICE INFORMATION HO90-11
U6	5322 209 71773	74HC132
U7-U8	4822 209 60059	MC34063A
U9	4822 209 60082	74LS08
U10	4822 209 60056	7406
U11-U13	4822 209 60058	L-6220
U15	4822 209 61547	MC34064

L1	4822 157 60374	80uH 6A
L2	4822 157 53909	100uH

C28	4822 124 23505	Elco 2200uF 50V
C29	4822 124 41687	Elco 1000uF 6.3V
C30	4822 124 23083	Elco 3300uF 25V

Various

BAT1	4822 138 10301	N1-Cad 2.3V
LS1	4822 280 10205	Buzzer
S1-S4	4822 271 30665	Spring se.contact
SP1-SP42	4822 268 10268	Stake pin contact
Y1-Y2	4822 242 72912	Resonator 12MHz
J2	4822 321 23144	Connector